THE
TROPICAL AGRICULTURIST
AND
MAGAZINE OF THE
CEYLON AGRICULTURAL SOCIETY.

VOL. XL. COLOMBO, JANUARY 15TH, 1913. No. 1.

CONFERENCE OF COCONUT PLANTERS.

ADDRESS BY THE DIRECTOR OF AGRICULTURE.

At the invitation of the Director of Agriculture a number of gentlemen representative of the Coconut planting industry met at the Council Chamber at noon on December 16th to consider whether there are any questions connected with the Coconut planting industry that required investigation and if so the steps that should be taken to investigate them. The following were present:— Mr. R. N. Lyne, Director of Agriculture, in the chair; Mr. T. Petch (Government Mycologist), Sir Solomon Dias Bandranayaka, Mr. A. S. Long Price (Chairman of the Kurunegala Planters' Association), Mr. N. J. Martin (Chairman of the Chilaw District Planters' Association) Mr, Solomon Seneviratne, Mr. J. D. Vanderstraaten, (Negombo), Mr. V. H. Cooke (Chilaw), Mr. John H. Perera (Negombo), Mr. D. J. Subasinha (Galle), Mr. A. W. Beven (Marawila), Dr. H. M. Fernando, Mr. H. L. De Mel, (Secretary of the Low Country Products Association) Mr. W. E. Gratiaen, Mr. P. Daly, (Visitor from South India), and Mr, C. Direberg, (Secretary of the Ceylon Agricultural Society.)

In opening the proceedings MR. LYNE said:—I wish to thank those present for responding to my invitation to meet me here that day. I invited twenty-one representatives of the coconut planting industry and I am sorry to hear from a number of them that they are prevented from attending owing to indisposition and other causes. The first idea of calling the meeting arose from a conversation I had with a gentleman, a representative of the coconut planting industry, who pointed out to me that the Committee of Agricultural Experiments was chiefly concerned with the cultivation of Rubber; and that it devoted very little interest to coconut planting in the Lowcountry. Before proceeding any further I wish to say that the decision you arrive at today it will be my duty to communicate to the Committee of Agricultural Experiments appointed by His Excellency the Governor to discuss with the Department of Agriculture matters connected with agricultural experiments. I wish to explain why the Committee of Agricultural Experiments must, of necessity, concern itself very largely with the cultivation of Rubber.

In the case of rubber we are at war with nature; and the whole rubber planting industry is nothing more or less than a huge experiment; and every single rubber plantation in Ceylon is an experiment, not only in the general sense that the whole industry is an experiment, but in a special sense that nearly every plantation is following its own methods of cultivation, tapping, coagulation and preparation. And we do not know where we were going to end up with this rubber yet; hence it is very necessary that we should proceed with great caution, so that if we found any sudden and unexpected catasrophe overtaking the industry we can by keeping our communications open beat retreat. We are now about to enter upon a special scheme of Rubber research.

I refer to this matter to explain why it is inevitable that the Committee of Agricultural Experiments which meets at Peradeniya should be very largely taken up with rubber investigation, but that we are not entirely absorbed with rubber this little bulletin No. 2 of Peradeniya, copies of which are laid on the table, will show you. We carry on coconut experiments at Peradeniya but I feel—and I think all the Committee and, no doubt, those present feel—that the coconut planting industry is not sufficiently identified with them, that we have only got a few trees; that they are old trees; that they are not in the coconut belt and that coconut planters do not know anything about them. Still if you look through that bulletin you will see that the Department is not entirely neglecting Low-country products.

With regard to coconuts we have not the same danger as in the case of rubber; but that we have a danger there is no doubt, and that danger is stagnation. The danger is that coconut planters have such good times with their trees that they will sit down and say: "my plantation is nice and clean; my trees are bearing well, yielding 60 nuts per tree per annum; prices are alright; I am making money; what is the use of bothering?" If we take that view then, of course, there is nothing more to say; but it is the duty of the Department of Agriculture to concern itself with all the planting industries of Ceylon, especially the great planting industries, and more especially with coconuts as I suppose, when all is said and done, the coconut industry is the greatest planting industry in Ceylon, and the greatest coconut planting industry in the world. So the danger, as I say, is in stagnation. But I do not want to do anything in the way of trials or investigations which has not the support of the coconut planters in which I include Landowners, Visiting Agents and Superintendents, a combination, of course, no part of which can be left out. We want the whole experience of the coconut planting industry to come up to our aid. I do not want to do anything about which I feel I have not the support of the coconut planters, because my idea is if we come to decide upon certain questions which require investigations and as to how they may best be carried out, to let the coconut planters feel that is their experiments we are carrying out, not ours. Perhaps the Department of Agriculture is better equipped for conducting experiments than private owners or companies because it is a part of the training of members of the staff to conduct experiments; to be very careful that everything is accurate and properly recorded, and our whole equipment enables us to conduct experiments better than a private institution can. But although we shall probably conduct the experiments, it will be the coconut planters' experiments that we carry out. We do not want to launch out into trials only to find out that the

planters take no interest in them. This would be of no use to us. This is the point of view I take, and I hope you will all agree with me. The Department of Agriculture—this is the view I take—in connection with the various industries under investigation is doing the same at Peradeniya and carrying out experiments representative planters want us to carry out; and so I want your opinion and advice first of all as to the objects of these coconuts trials, the method to be adopted and the locality of the trial ground. In order to give you something to talk about I have put down on paper a few questions which, I think, may very likely be considered worthy of investigation. The first is, to begin at the beginning—the use of dynamite in planting up estates. This is quite a new plan of planting. I have no doubt all of you have read as to how it is being taken up in all parts of the world, in England and the Colonies. There are three ways in which dynamite is being used now. The first is in clearing land; the second in holing, and the third in cultivating. If we open a trial ground I think it will be useful if we cleared a portion by means of dynamite—cleared the stumps—and also did the holing by dynamite. In Peradeniya in planting up a small area with Para Rubber we holed with dynamite, and this will furnish us with some useful data by and by with regard to the use of dynamite in holing. We have returns as to the cost and it works out rather against dynamite; but an experiment on such a small scale cannot be accepted as final. This is one question which I think requires investigation: as to whether dynamite could be used in coconut planting. Another question is that of spacing. I have no doubt many of you present at this meeting, and many who are not here have very conclusive views on the distance coconut trees should be planted; but I think it is also very likely you do not all agree and, therefore, I think this would be a point at any rate, that we should investigate if we decide upon any trials at all. If I may be permitted to express my private opinion it is that I think coconuts—and not only coconuts but Rubber, and other products—are planted too closely in Ceylon. This is the impression I gained on my first visit to Ceylon. I went down the southern part of the Island, through Kalutara and was astonished to see the closeness in planting. This may be suited to Ceylon; but it is a question we may investigate. Then again, we should consider the methods of cultivation. At Chilaw the other day I had the opportunity of meeting some of the leading men there and discussing with them the question of cultivating coconuts and I explained the principles of dry-farming. And it seems to me that the principles of dry-farming are capable of being applied to coconut cultivation, especially in the dry parts of Ceylon; and, of course, the questions also have to be discussed of mulching, green manuring, clean weeding, grazing, catch crops, and all sorts of questions connected with cultivation upon which I do not suppose the coconut planting community in the Island are all agreed. If we have a proper trial ground where we know that records are accurately kept, I am quite certain the experiments would bring to light many points which, perhaps, are obscure now. There are questions connected with drying of coconuts to investigate whether or not it would be profitable to treat our copra as is done in Cochin. Some of you present at the meeting might remember that when we were talking about this matter in Chilaw the other day, the question was raised as to why Cochin copra fetched more than Ceylon copra, and I read an extract from a recent Report of the Curator, Seychelles, in which it was said that they only marketed finest grade copra, while the second grade was turned into

oil. Well these are questions which may be well worth investigating. I think I have said enough to open this discussion. There are two distinctive questions which I want to put before you. The first is—and I will be very glad if when you begin to discuss the matter you will kindly keep them quite distinct—to consider whether there are any particularly important questions affecting coconut planting in Ceylon that require investigation? This is the first question; and when you have decided upon that we will go on to discuss the second question:—what steps should be taken to investigate them?

Dr. H. M. FERNANDO opened the discussion on welcoming the proposed action with a view to developing the coconut industry of the Island on scientific lines. He did not think the question of spacing required any investigation and said that 27 feet may be considered the happy medium for coconuts grown in the Negombo-Chilaw district. Green manuring was in his opinion a matter which called for further experiment since the results of the trials made at Peradeniya, which was not a typical coconut district, hardly applied to the low country. One of the most important points which needed study was how to combat droughts and whether the principles of dry farming could be successfully practised in coconut cultivation.

Mr. A. W. BEVEN gave his experience of the value of thorough cultivation in minimising the effect of drought.

Mr. H. L. DE MEL emphaised the importance of bringing coconut beetle pests and noxious weeds such as "illuk" grass under the control of plant pests Boards. Referring to yield he found 70 nuts per tree per annum a good average. He thought the direction in which they should work was to try and increase the thickness of the kernel or meat in the nut.

Mr. N. J. MARTIN who also pressed for enquiry into the question of how to mitigate the damage done by drought thought it necessary to experiment in copra-making with a view to turn out the best copra in the shortest time. From enquiries made while in London he was inclined to the belief that the term "Cochin Copra" was only a trade name and referred to a brand or quality of superior manufacture which probably included the best copra from Ceylon and that "Ceylon Copra" similarly referred to inferior stuff of which he was shown samples that were a disgrace to the Island and he believed never came from here. He thought that some action should be taken to clear up the misapprehension that existed.

Mr. J. D. VANDERSTRAATEN said that coconuts suffered also from an excess of rain and considered it advisable to enquire how the effect of too much moisture, such as existed in the Southern Province, could be counteracted. He inclined to the belief that rapid drying in copra-making results in loss of oil. He would wish to see statistics collected with reference to the effect of different manures, dry and wet seasons, &c, as these figures would be of immense value to the planter.

The CHAIRMAN summarised the discussion and drew up a list of subjects that should form the basis of future enquiry, and it was decided to approach Government with a proposal to establish an experiment station to serve as a trial ground for the solution of various coconut problems. It was further resolved to add the names of a number of representatives from the chief coconut districts to the Committee of Agricultural Experiments and to ask these gentlemen to serve as an advisory sub-Committee in connection with the proposed programme of work.

NOTE ON EXPERIMENTS WITH MR. BEDDEWELA'S TERMITE MIXTURE.

Mr. Beddewela having invited a test of his Termite mixture, an appointment was made with him for the 11th October. On that date several termite nests (inhabited by *Termes redemanni* and *T. obscuriceps*) were opened under Mr. Beddewela's supervision, and treated with his mixture. This preparation is in the form of sawdust impregnated (according to the inventor) with certain medicinal oils. After the nests had been opened to a depth of a foot or eighteen inches, the mixture was sprinkled freely over the exposed surface. Some of the nests were immediately filled in with loose earth, others were left open. Mr. Beddewela's instructions were that the treated nests should be left open for several days (up to a week) before being filled in. Unfortunately, through some misunderstanding, the nests, which should have remained open were filled in and turfed over during the following two days. The inventor claims that the treatment will result in the death of the insects or—if not—in the discontinuance of their work at that spot. Most of the nests that were subjected to the experiment showed signs of renewed activity within a week of the date of treatment, and fresh earth-work is still noticeable after an interval of three months. But the colonies appear to be greatly weakened and the work is much less than might have been expected under normal conditions. If exposure for the specified time is an essential part of the treatment, there is a possibility that the practical recrudescence may be due to the too early closing of the treated nests. It will be necessary to repeat the experiment under more exact conditions and with proper controls.

ERNEST GREEN.

Govt. Entomologist,

R. B. G.; Peradeniya, 28 Dec. 1912.

FORESTS AND GARDENS, MAURITIUS.

The report on the Forests and Gardens Department of this Colony (P. Keenig, Director) is chiefly taken up with Forests, to which 10 out of 14 sections are devoted. Under the head of Revenue and Expenditure there is shown a deficit of something under Rs.80,000. The revenue is made up of nearly Rs. 40,000 on acconut of major forest produce, and about Rs. 65,000 for minor produce.

The gardens referred to are the Royal Botanic Gardens, Pamplemousses, the Nursery Gardens, Curepipe, and the Réduit Grounds.

Nothing special is reported under Agriculture. Cotton, cacoa, nutmeg, coffee, arecanuts and Para rubber are referred to under Economics but not as commercial products.

Under Entomology *Phytalus Smithi*, a new beetle pest on sugar cane is reported on at length. In August 1911 an ordinance was passed to prevent the distribution of plant diseases, but the erection of a fumagatorium still awaits the creation of a Department of Agriculture.

AGRICULTURE IN SOUTH NIGERIA.

The report of the Director of Agriculture for 1911 has come to hand, and refers to many topics of interest.

The cotton growing experiments in the Eastern Province during 1910-11 gave unsatisfactory results owing to late sowing and bad season. The average yield of seed-cotton per acre was 326·2 lb., and the average yield of lint 102·3 lb. showing a percentage of 31·35 lint. Eight varieties were grown including two indigenous. The 1911-12 season gave better results the total yield of lint from 96 acres being 11,979 lb. an average of 123·7 lb. per acre. No less than 11 varieties (including Allen's long staple) were represented, but unfortunately figures are not given for each variety to enable a comparison of results to be made.

A ten-acre plot of American white maize planted in April and harvested in August gave about 900 lbs. seed per acre, while maize (Lagos white) planted for fodder in April and cut from May to July gave nearly 18½ tons of green fodder.

Two acres planted with Cassava yielded 13,680 lb. fresh roots which gave 4,594 lb. of peeled and dried roots per acre.

We read that at the Calabar Economic Gardens a new plot of cocoa was planted 15′ × 15′ with rain-trees (*Pithecolobium Saman*) and bananas as permanent and temporary shades respectively, an arrangement which hardly conforms to the ideas of local planters as to the requirements of the cocoa tree. Para rubber has also been employed as shade for cocoa.

The series of interesting experiments carried on at Onitsha Economic Garden proved that yams, sweet potatoes and cassava could be profitably grown. The return from an acre of West Indian yams (variety not named) was 3 tons 1 cwt., the cost of production £6. 9. 10, the value at local rates £11. 3. 9, and the profit £4. 13. 11. Sweet potatoes gave a yield per acre of about 7 tons 8 cwt. and showed a profit of about £2. Cassava yielded nearly 3 tons per acre and returned a profit of £5. 7. 11.

At Ebute Metta the tapping of 18-year-old Hevea on alternate dates on 62 occasions between April and November gave an average yield of over 1½ lb. dry rubber per tree. Twenty tappings resulted in the excision of only an inch of bark. Further tapping experiments of an interesting nature are reported on. A hundred five-year-old trees with an average girth of 22·82" at 3 ft. from the ground tapped 63 times between May and December (tapping being done every third day)gave a total yield in dry rubber of 141 lbs. or an average of 1 lb. 6 oz., which, considering the age of the trees, is considered most satisfactory.

We read that excluding the African oil palm, cocoa was the most important agricultural product exported during the year. The quantity exported was 50 % more than that of the previous year, and 168 % in excess of the average of the preceding five years. And yet it is stated that the industry is far from being in a satisfactory condition, while the produce is referred to as inferior owing to bad cultivation and faulty curing.

We do not find any reference to the coconut palm, though under thatching palms mention is made of the Nipa and Sago.

AGRICULTURAL WORK IN JAMAICA.

THE BANANA INDUSTRY.

The report of the Director for the year ended March 1912, deals with Public Gardens, Agricultural Experiments, Agricultural Education, Laboratory work, etc.

There is a more hopeful spirit among the sugar planters owing to higher prices being obtainable for sugar. The export during the year was 20,000 tons. Estates are introducing better machinery and a marked improvement is taking place in this direction in all sugar districts.

In spite of damage by drought, the increased price of coffee has resulted in a return of over £150,000—the bulk of this coming in from coffee grown by the peasantry.

Regarding Cocoa it would appear that the world's production is beginning to overtake the demand with the natural results of sluggish markets. The large increase in West African cocoa is the chief factor of this enhanced output, while in Jamaica itself the production has trebled during the past 10 years.

From Bananas there was a revenue of no less than one and a half million pounds sterling during 1911, the bulk of the produce going to the United States after the cessation of the Direct Line to England. The industry is growing steadily and it is expected that the revenue therefrom will soon reach two hundred thousand pounds. The Director credits its Banana industry with a civilising effect upon the people, and traces the progress in roads, bridges &c., to the prosperity of the trade in this product. "Nothing else," he says "can do what the banana industry has done and is doing for the country." The extreme watchfulness of the Government and the effective measures it has provided for the preservation of the crop from the ravages of diseases (referred to elsewhere) are therefore not surprising. Great importance is placed on the work of travelling inspectors in this connection.

Under coconuts reference is made to Budrot (which has been proclaimed under the Plant Disease law) and leaf disease (Pestalozzia) the prevalence of which is considered to be favoured by drought. The export of coconuts, which was reduced by the hurricane of 1902 from 25 to 4 millions per annum, is again recovering itself and has reached an output of over 20 millions. In this connection the Director says: "The future prospects for coconut products are excellent, and although this crop can hardly be regarded as the Consols of Jamaica (as in the East) owing to the occurrence of hurricanes, it is still one of our safest and most satisfactory staples, and should be extended everywhere," Banana Cultivation has enabled many coconut groves to be resuscitated and new ones planted under favourable conditions of cost.

It would appear that Castilloa rubber is better suited than any other species to the conditions prevailing in Jamaica.

GREEN MANURING IN SOUTH INDIA.

MR. W. H. HARRISON, Agricultural Chemist, has prepared a useful note on the Indigenous Manures of South India and their Application, from which we take over the following reference to Green Manures which should prove of local interest.

GREEN MANURES.—For purposes of Green manuring, cultivators use either the leaves and twigs of trees and shrubs found growing in waste places or in the forests, or special crops such as kolinji (*Tephrosia purpurea*), sunn hemp (*Crotalaria juncea*) or Daincha (*Sesbania aculeata.*) Of these the former naturally vary largely in composition according to their source and the kind of tree from which they are collected, and as many analyses have been made of them in various parts of India, it is unnecessary here to refer to them in detail. With regard to crops grown specially for green manures the following analyses showing the distribution of the nitrogen in the plant may be found interesting :—

	Sunn-hemp.				Daincha.				Indigo.				
	Leaves etc.	Stems.	Roots.	Whole Plant.	Leaves.	Stems.	Roots.	Whole Plant.	Leaves and Flowers.	Stems.	Roots.	Pods.	Whole Plant.
Per cent of nitrogen. ...	1·34	·480	·315	·708	1·236	·444	·224	·619	·60	1·18	1·22	3·07	2·18
Distribution of nitrogen in plant in per cent. ...	54·7	41·8	3·5	100·0	52·7	41·7	5·6	100·0	35·2	29·1	3·7	32·0	100·0

The amount of nitrogen which can be introduced into a soil by means of green manuring is very large. For instance at the Central Farm Coimbatore, a crop of Daincha was obtained weighing 20,000 lbs. per acre and this quantity was found to contain approximately 125 lbs. of nitrogen.

The distribution of nitrogen in the plant is an important point to bear in mind. In certain parts of the Madras Presidency, as in the Kistna delta, it is the custom to raise a crop of sunn-hemp for fodder purposes immediately the paddy crop is taken off the ground, the sunn-hemp being cut off fairly short and the stubble ploughed in. Such a method of cultivation can hardly be said to amount to green-manuring for the greater part of the nitrogen in the crop is removed with the leaves and stems and only the small portion remaining in the roots and stubble is utilized. Where circumstances, however, are favourable, it is possible to cut the crop for fodder purposes and also to obtain sufficient secondary growth to give a heavy green-manuring. The latter method has been followed with success as Coimbatore.

HEVEA RUBBER IN BRITISH GUIANA.

DETERIMENTAL EFFECT OF SHADE.

Those who plant wind-belts to protect their rubber, whether they be coconuts or other plants of economic value as a subsidiary industry, must see that there is sufficient space between the rubber and the other trees to avoid any chance of the latter over-shading the former. Experiments were recently carried out by the Botanical Department in British Guiana in order to prove how shade affected hevea and sapium trees (*S. Jenmani*), and the trials showed that both these rubbers require exposure to the sun and satisfactory drainage to enable them to flourish. Again, it has been found that where the rubber has been planted in belts three rods wide, cleared through the forest, only the trees in the middle of the belts have grown at all satisfactorily; wherever the trees have been at all shaded they have made very irregular and slow growth.

These experiments were carried out at the Issorora Station, in the North-West District. Here, as in former years, only Hevea and *S. Jenmani* have done well, the Castilloa and Funtumia trees are for all intents and purposes more or less failures, the Para especially comparing favourably with that reported from elsewhere. Again at Pln Christianburg on the Demerara River, out of twenty-six acres planted the Para trees alone showed promise of any future value, and it was noted that on the lighter soils where the imported Para is making good growth, the indigenous sapium is very unsatisfactory. This is similar to what we hear of the West Coast of Africa. There the Hevea is doing well, when properly looked after, and will soon replace the indigenous Funtumia, whose yield is so poor, or the vines, which are rapidly being exterminated by the natives.

At the Bonasika Sapium Reserve a very unfavourable feature gradually became noticeable during the repeated tapping periods. The rubber (sapium) yielded at the first tapping-period was of excellent quality and kept well; that yielded during the second and third tapping periods also at first appeared to be of satisfactory quality but in the course of a few weeks many of the biscuits developed a marked tendency to tackiness. This defect becomes more and more serious in the successive tapping-periods until in the cases of certain trees it became impossible to get the latex to coagulate as rubber, and it dried up to a viscous, sticky and apparently resinous mass, and the caoutchouc content decreased from 94·5 per cent. in the first and best sample to 81·3 per cent. in the resinous coagulated mass. This tendency to tackiness is far more marked in biscuits prepared from the latex than it is in carefully prepared self-coagulated "scrap." A few Para trees have been planted at Bonasika, and the desirability of clearing more of the land there and planting it with this variety is under consideration. At the Onderneeming School Farm, the total number of Hevea trees under cultivation on March 31st, 1911, was 525, the age of the oldest being 10 years; all the trees are making satisfactory growth.—*Tropical Life*, November 1912.

THE THIRD INTERNATIONAL RUBBER EXPOSITION.

CEYLON'S EXHIBIT.

The India Rubber World which has an interesting account on the exhibit sent from Ceylon, says:—The Ceylon exhibit, which was replete with interest, was in charge of Mr. F. Crosbie Roles, whose previous experience at Chicago and St. Louis rendered him specially qualified for the office of Commissioner for Ceylon. He was assisted by Mr. E. B. Nathanielsz, a Sinhalese, who had come over with the exhibit. Rubber samples to the number of 64 were contributed by 32 estates, through 15 managing agents, distributed among the following classes: crepe, 2,192 pounds; scrap 800 pounds; sheet 150 pounds; smoked sheet 104½ pounds; worm etc. 129 pounds; total weight 3,375½ pounds. The samples showed a judicious selection of the qualities in which Ceylon is at its best. They included one sample of block worm rubber from the Gikiyanakande estate of G. H. Golledge, Neboda, which had been shown at the 1906 Ceylon Exhibition and which was still in unimpaired condition.

Another samble exhibited was one of 30 pounds from L. Bellerio specially prepared without acid by his new process. This sample was to be ried by a prominent American rubber company, after the close of the exposition.

In connection with the Ceylon exhibit there was distributed a "Ceylon Handbook," by R. H. Lock, M.A., SC.D., Acting Director of the Botanic Gardens, and C. O. Macadam. An interesting series of tables shows the growth of rubber cultivation in Ceylon from 1,750 acres in 1900 to 230,00 in 1912.

The plantings show since 1909, a yearly increase of about 7 to 10 per cent. In Mr. Crosbie Roles' opinion it would be safe to reckon on an augmentation of 10 per cent. a year in plantings. The percentage of increase in yield depends, he added, not upon the recent plantings, but on those of five years before. Hence the increase in planting from 40,000 acres in 1905 to 200, 000 in 1906 finds an echo in the advance of yield from 3,194 tons in 1911 to the estimate of 6,000 tons for 1912.

Exports increased from 19 tons in 1903 to 3,194 tons in 1911; having been for the last three years: 1910, 1,600 tons; 1911, 3,194 tons and 1912 (estimated 6,000 tons).

Among the exhibits were 12 bottles of rubber latex from the Director of Agriculture, Peradeniya, as well as five trunks of rubber trees from the same source. Desiccated coconuts, plumbago, coconut oil, cardamoms and other Ceylon products were likewise shown. Though not directly connected with rubber, they represent the produce of the island, on which was built up the present development of the rubber trade. Ceylon kept well in line at the exposition, which marks another step in its commercial progress.

Mr. Crosbie Roles in conversation alluded to the advantage which American manufacturers had derived from being thus brought into touch with plantations, through the various Colombo managing agents, whose names appeared in conjunction with the plantation exhibits. The object of the exposition, in the dissemination of information about Ceylon, had been fully attained.

One of the Ceylon samples (of the Rosehaugh Estate) has been awarded the Silver Medal in the competition of the Rubber Growers' Association.

RESULTS OF 7 YEARS' COTTON EXPERIMENTS AT MAHA-ILUPPALAMA.

First sowing took place at the end of September or early in October 1904 on a block of 35 acres with Upland seed and sowings have been continued every year, that is to say for 7 years; the first sowing failed to germinate.

On November 11th this block was replanted with Egyptian cotton. It is stated that the crop bore well but there are no records of the yield.

On October 13th, eight acres and on November 1st, twelve acres making 20 acres in all were opened with Sea Island. This produced 6,788 lbs. of seed cotton, yielding 1,766 of lint, an average of 339 lbs. seed cotton per acre.

The total area shown in 1904 (rainy season October—January 1904-05) was 60 acres as follows :—

Sea Island	...	...	...	20 acres
Upland ...	...	...	...	3½ ,,
Egyptian	...	...	...	36½ ,,
		Total	...	60

This yielded 22,576 lbs. seed cotton which is at the rate of 376 lbs. per acre; the Egyptian, the only variety kept separate, yielding at the rate of 339 lbs. per acre.

It is rather difficult to follow the 1905-06 sowing. Some of the plots of the previous year were ratooned, portions of these again being abandoned. But it is not clear how much new sowing was done and what it produced. The report however states that "the cotton did very badly and was practically a failure."

The 1906-07 sowings were :—

Sea Island	...	...	...	23 acres
Egyptian	...	...	...	37 ,,
		Total	...	50 ,,

This yielded :—

Egyptian	...	...	...	1,709 lbs:
Sea Island	...	...	...	504 ,,
		Total	...	2,213 ,,

Average yield per acre 44 lbs.

In the rainy season of 1907, 17 acres were planted, from which 700 lbs. seed cotton were obtained in 1908, an average of 41 lbs. per acre. The variety is not stated.

An account of the cotton trials at Maha-illuppalama was given by Mr. M. J. S. J. McCall, Director of Agriculture, Nyassaland, who advised among other things that trials should be made with irrigation, planting to take place in February or end of January to enable the cotton by flowering later to escape rains in April,

20 acres were planted accordingly with Egyptian in February 1909. A return of 124 lbs. of seed cotton per acre was obtained. The experiment of sowing in February was repeated in 1910 with :—

Sea Island	...	...	...	3 acres
Egyptian	...	...	...	3 ,,
American Upland...		...	...	3 ,,
		Total	...	9 ,,

The crop was

Sea Island	...	...	...	nil
Egyptian	...	...	...	599 lbs.
American Upland		...	...	1,123 ,,

An average of 200 lbs. of seed cotton per acre of Egyptian and 374 of Upland. In the following season—1910-11, 3 acres were sown during the North-East rainy season, with upland (Allen's long stapled) which yielded at the rate of 366 lbs. per acre seed cotton.

The foregoing is a summary of the results of the cotton growing experiments at Maha-illuppalama extending over 7 years or seasons. In four of those the crops were partial or total failures; in the remaining three less than half crops were obtained. A good crop is about 1,000 lbs. of seed cotton per acre.

The trials have clearly demonstrated the unsuitability of Maha-illuppalama for Sea Island and Egyptian cotton with or without irrigation. American proved the best of the three but yet not satisfactory. No trials seem to have been made with Indian cotton.

Caravonica and Peruvian and Bahama, three cottons were tried in 1904 with no success.

The causes of failure are stated to have been :

1. Shortage of rain in the planting and growing season.
2. Continuance of rain during anticipated dry period.
3. Unsatisfactory growth and uneven flowering produced by irrigation.
4. Bad seed.
5. Ravages of insects.
6. Strong winds.

To which may be added insufficient separation of the land probably in some cases.

ANTS IN AN APIARY.

A good plan is to trace the ants from the apiary to their nest by the tracks they make. At night, stop up with clay every entrance to the nest but one. Through the open entrance, dose the ants' nest with about 2 table-spoonfuls of carbon bisulphide and close it with clay. After a few doses, always given at night, the nest will die out.

If the legs of the stands on which the hives are stood in tins of water no ants should reach the bees; but long grass must be kept clear of the tins, or in windy weather it is apt to blow across them and form a bridge for the ants.

Moth balls rubbed on the woodwork of hives have been found to keep away the small ants. *Agricultural Gazette of N. S. W.*

EXPLOSIVES IN AGRICULTURE.

The use of dynamite and other explosives for agricultural purposes is now widespread in American and Australian centres and elsewhere. The idea is by no means new, for we hear that farmers in the Western States of America have used dynamite with marked success for the last twenty or thirty years, and now that their example is being followed by planters in the more tropical zones, one can truly describe the use of explosives in agriculture as being world-wide, with every tendency of its becoming as common as the use of steam ploughs or mechanical tractors for cultivation and drainage work, on account of its efficiency and low cost.

Briefly put, farming dynamite or explosive can be used with advantage for the following reasons :—

(1) To break up hard or virgin soil to facilitate and thereby reduce the cost of ploughing.

(2) To blast out, for removal, boulders, rocks and especially tree-stumps and entire trees,

(3) To aerate subsoils and counteract any tendency of the ground to become infested with pests.

(4) To break up lands, hard or soft, so as to equalize the water-supply, to encourage drainage, or to facilitate the digging out of the deep gullies, drains etc.

(5) To makes holes for planting trees (at the same time rendering the surrounding soil free of insects), and for putting in fence posts, uprights for buildings etc.

(6) To destroy locust swarms, tsetse flies, and other pests, especially where they can be attracted to a given centre by bait; or to kill their grubs etc. in the soil where known to abound.

At the same time, it must not be thought that the use of explosives does away with the necessity of ploughing, for it is quite otherwise. Their use only expedites and facilitates, thereby cheapening the cost of ploughing and general cultivation, especially deep ploughing or gully-cutting. Explosives bring up plant foods to the surface that would otherwise not be available, or else they liberate such food by opening up the soil, at the same time enabling the water and roots of the trees to go down to and come into contact with the plant food and withdraw them for transport up the trunks to the crowns of the plants. This is especially the case with subsoils in coconut lands, as quoted in Tropical Life for September, p. 169, where we report that a coral subsoil, 2 to 9 ft. below the surface was broken through in places allowing the water to drain away, instead of water-logging the roots of the palms and doing them perhaps serious harm.

The chief raw materials in use are glycerine, cotton waste, kiesel-guhr or absorbent earth, and nitre, all of which are, of course, non-explosive,

on one or two of these, as representing what seemed to him to be the two chief matters outstanding for discussion at the present time.

Two Chief Points.

The first of these is the question of audit and control—a subject which has been discussed very often before both by ourselves and by provincial Conferences. At the first meeting they obtained, through the labours of a strong sub-committee, a clear idea of the method adopted for audit and control in each province and they proposed on this occasion to take up the subject in further detail. The Government of India have several times expressed their opinion that the needs of audit and control should not be allowed to occasion the development of anything in the shape of a large new department of Government, and they have frequently advised that the audit and control of Rural and Urban Societies should, as far as possible, be handed over, as time goes on, to the union of Societies themselves. To this opinion the Government of India still adhere. It is an opinion based on the best experience in Europe and it has been accepted as correct by the Provincial Governments. At the same time with the increase in the number of societies the necessity for expansion in audit and control has correspondingly increased and Registrars in more than one province are becoming anxious as regards efficiency of the control for which they are responsible. They had to consider whether they could not secure what is wanted in this direction without departing in any way from the general principles already accepted as correct. The audit must be such as to secure two things, namely—that all transactions of societies are duly accounted for and that the public retain confidence in the control. Some of the reports received show that there are very real dangers to be guarded against in connection with the accounts of the societies and it will be for them to consider what line should be taken to provide the necessary supervision and audit without doing anything which may lead to the creation of a Government department.

The other points of special importance to which he drew attention was the need for strengthening the connection between the co-operative movement and the development of agriculture in that country. The Government has done a great deal in recent years to encourage progress in both of these departments, with no small degree of success. Continuing further Mr. Maclagan said that Sir George Clarke has quoted Canon Ribington, whose knowledge of conditions in the mofussil is profound, as having told not long ago that he believed that the agricultural and co-operative departments were making a deeper impression on the life of the people than any of the other measures which Government are engaged in promoting. What they desired to see, and what to some extent has already commenced, is the combination of the efforts of the few departments. The point has been brought to especial notice in a resolution of the Board of Agriculture in November of the last year and in an article by Mr. Dushan in the July number of the *Agricultural Journal of India*, and it is generally acknowledged that though there are many other subsidiary means for improving the economic position of agriculturists in that country, the main hope of putting the agriculturists on a right footing rests in the adoption of co-operation to the needs of agriculture. A reference to the useful bulletins of social and economic intelligence issued by the Agricultural Institute at Rome shows the important part which co-operation plays in the economic development of agriculture in Europe.

A great deal can be and has been done in India by co-operative credit alone, but the new Act has now widened opportunities for combination by opening out the spheres of co-operative production, co-operative distribution and co-operative insurance. Special steps have been taken to finance agriculturists on the introduction of the new irrigation by the increase of Co-operative Credit Societies in Bombay, in Burma and in the Central Provinces. The co-operative work has in many places been brought into contact with that of agricultural associations, and societies of a co-operative character have been started, and in many other ways the combination desired has been already commenced in many provinces. Great help has been given to co-operative movements by the Deputy Directors of Agriculture and there would be, he hoped, an opportunity at the present Conference of discussing the manner in which and the extent to which help of this kind may be further developed.

COAGULATION OF FICUS ELASTICA LATEX.

For the information of a correspondent and others who may be interested, we give below an account of tapping and coagulating by E. S. Carr (Conservator of Forests, Assam) which appeared in the *Agricultural Bulletin of the Straits* some time ago.

Cuts should be made by a V-shaped chisel or gouge, at right angles more or less to the lime of growth, 18 inches apart half round the stems.

The latex which falls is caught on bamboo-mats which are shifted about by boys, and is stripped off when coagulated. The latex coagulated in the cuts, which turns reddish brown owing to the stain from the bark is also stripped off within 48 to 56 hours.

The stripped rubber is laid on shelves to be air-dried and may afterwards be pressed together by means of a screw-press.

By soaking the mats in a solution of the bark the mat-rubber can also be got of a red colour. The red rubber is most appreciated in the London market.

P. J. Burgess writing in the same Journal, suggests warming the latex to 40°C and treating it with a solution of 2 % tannic acid till there is 1 % present, *i.e.* adding the solution in the proportion of 1 to 19. The mixture is then well agitated but not sufficiently to raise a froth. This raises a cream which can eventually be lifted out and then washed or rolled.

AGRICULTURE.

THE NURSING MOTHER OF THE STATE.

The principle article in the December number of the *Review of Reviews* is called "The Ten Commandments of Empire" and in it is set out a national non-party programme in the compass of Ten Commandments :—1. National Defence. 2. Education. 3. Agriculture. 4. Welfare of the Worker. 5. The Life Blood of the Empire. 6. National Administration. 7. National Health. 8. International Relations. 9. Religion. 10. Business. It is explained under No. 3 that "Agriculture is the nursing mother of the State."

REMARKABLE RECORD OF A JERSY COW.

The London *Times* of December 9th has the following from a correspondent:—

Red Deer is only a town of 2,500 inhabitants, but it has achieved fame through the remarkable performance of a Jersey cow, Rosalind of Old Basing. This animal, bred and owned here by Mr. C. A. Julian Sharman, has won distinction by producing in three years 37,847·25lb. of milk—2,504·39lb. of butter. It is not often, I imagine, that a cow has a banquet given in her honour; but the significance of Rosalind's victory was felt to be so great that nothing short of a public festivity could be adequate to the occasion. The Provincial Minister of Agriculture, Mr. Marshall, and the head of the Canadian Pacific Railways Department of Natural Resources, Mr. J. S. Dennis, united with the Mayor and other local dignitaries in celebrating the event. As an opportunity for advertising the stock-raising qualities of this district—qualities shared by practically the whole central part of the province—the victory is peculiarly gratifying to the inhabitants. But it is an event of real public interest and value also; for it will help to make the "grain-miners" think, and the more they study the question the more clearly they will see that the constant cropping of grain is not only wasteful of the soil's fertility but actually less profitable than raising fodder crops and selling them "on the hoof."

Mr. Dennis, who has been tireless in his advocacy of science and progress in agriculture, was particularly outspoken. The grain-mining, he said, would reduce the fertile prairie provinces of Canada to the level of certain States of the neighbouring Republic where the same policy had been followed. On the other hand, if farming here were developed along right lines, Western Canada should become one of the most intensely cultivated and densely peopled part of the British Empire. The men brought into Canada should be such as would not waste and exhaust her natural resources but devolop them properly.

The effect of the cow's success has already been felt by her owner. While I was in his presence a letter was handed to him. It was from a total stranger, at a distance, and it enclosed a cheque for $250 (£50) for "the best bull calf you can give for the money." Rosalind alone, I may say, has returned her owner £200 in three years, by cream and skim milk, besides giving three heifer calves for which he has refused £400. One of his neighbours, Mr. Michener, member for Red Deer in the Provincial Parliament, has a fine Holstein herd; and two other farmers, Mr. Trimble and Mr. Richards, have come to the front as Ayrshire breeders. There is a very strong inducement to go in for dairy cattle, the supply of cream and milk throughout the west being much below the demand; but hired help also is scarce, and many farmers shrink from the exacting and constant labour required to bring in the high profits which dairying yields.

ROYAL BOTANIC GARDENS.

Visitors to the Royal Botanic Gardens, Peradeniya, for the month of November and December 1912 numbered 3,851 and 2,873 respectively.

VANILLA PRODUCTION AND CONSUMPTION.

The following statistics have been taken from an article in *L'Agriculture Pratique des Pays Chauds* for April 1912.

From the figures given it is calculated that the exports of vanilla from the French colonies during 1910 were as follows :—

1910.	Pounds.
Tahiti	564,782
Réunion	142,868
Madagascar	94,169
Mayotte and dependencies	106,095
Guadeloupe	19,996
Martinique	2,554
The Gaboon	693

It should be added that figures are available which show that the exports from Guadelope in 1911 were 39,178 lb.; and from the Gaboon; 1,111 lb. The latest figure given for French Guiana is that of 18 lb. for 1909. As is pointed out in the article, the matter should be completed by the inclusion of New Caledonia which produces annually a fair amount of the spice, of which statistics hardly make mention.

The exports for 1910 from places other than the French colonies were :—

1910.	Pounds.
Seychelles	51,377
Mauritius	1,874
Ceylon	660

The production of Mexico is given as an amount corresponding to 333,043 lb. for 1909-10. The latest figure given for Java is that of 1909—7,700 lb. It may be mentioned that the exports from Ceylon in 1909 were comparatively high, being 3,562 lb.

The world's production is placed at an equivalent of 1,320,000 lb. of which about 880,000 lb. is stated to be grown in the French colonies.

Consumption.

The consumption year by year in the different countries is much more regular than is shown by the statistics. In order to give exactly the quantities of vanilla consumed annually at the different centres, it would be necessary (and this is not possible) to know the amount of the local stocks at the end of the year. The following figures are equivalent to those given for the different countries, for 1909 :—

1909.	Pounds.
Germany	234,080
France	125,239
Austria-Hungary	62,040
Italy	24,843
Belgium	23,166
Sweden	2,158
Norway	1,984
United States	1,118,106

Statistics do not give information as to the consumption of vanilla in the United Kingdom; it is considered to be about 100,000 lb. yearly. Further, the estimate is made that the amount of vanilla consumed by Russia is 33,000 to 44,000 lb. The value of the vanilla used in Holland in 1909 corresponds to about 12,000 lb. The best sources of information permit it to be stated that the Swiss consumption of vanilla is about 13,000 lb. In 1916, France exported 5,588 lb. of vanilla to Denmark, and this figure represents approximately the consumption by that country.—The *Agricultural News*, November 9, 1912.

PECULIAR BEHAVIOUR OF A SWARM OF BEES.

The following letter by N. S. Mayo of Blackstone, U.S.A. appears in *Gleanings in Bee Culture*, of November 15, 1912:—On September 11, six weeks ago to-day, some boys called my attention to a swarm of bees clustered on the limb of a large white oak tree, about fifty feet from the ground. As the tree stands in front of my house it has been easy to watch them. The swarm was a large one. No one is positive when the bees settled there, although the workmen in the fields near my house say that they saw a swarm pass and go into the grove the last of July, and they tried to find them but failed. To my knowledge this swarm has been there six weeks, and for the past four weeks it has been gradually growing smaller due to clumps of bees dropping off to the ground from weakness, particularly on cool mornings, until this morning the cluster was not larger than a man's fist. Since I first noticed the cluster it has moved gradually about six feet further out of the limb. Is it not very unusual for a swarm to hang like this until the bees starve?

Later.—The last of the swarm dropped from the limb on the 20th or 21st of this month and all died on the ground beneath the limb. There was no comb built anywhere on the limb.

CONGEA TOMENTOSA.

(*Illustrated.*)

The Natural Order *Verbenaceae* affords us some of the most showy of flowering plants, notably *Petroea volubilis*, with its beautiful blue and violet flowers, and *Congea tomentosa*, the subject of this note. The latter is a comparatively recent introduction from Burma, its native home, and in beauty and charm of blossom rivals the most beautiful of flowering climbers. It bears large loose sprays of inflorescence which remain bright and unfaded for several weeks. Like some other well-known favourites, the showy part consists, not of the actual flower but of the bright coloured persistent bracts subtending the flower. At first of a delicate pink shade, these gradually merge into lighter tints of pleasing contrast. The plant obviously deserves a place in every garden, and will thrive from sea-level to about 3,000 feet elevation. It has not as yet produced seed at Peradeniya, but may be propagated with comparative ease if cuttings of the mature wood are inserted in a bed of light sandy soil, during the wet season, and kept shaded and moderately moist.

H. F. MACMILLAN.
18-12-12.

Photo by H. F. Macmillan.

CONGEA TOMENTOSA.

A Beautiful Climber, with large Sprays of Delicate Pink Blossom.

BANANA DISEASES IN THE WEST INDIES.

The Report of the Director of Agriculture of Jamaica for the year ended March 1912 contains a lengthy reference to the diseases of the Banana, a matter which has caused considerable anxiety both to the Government and the planters during the year.

Ceylon bananas are practically free from disease, but the occurrence o five distinct forms in Jamaica suggests the possibility of one or more of these being introduced into the Island and of disaster befalling the local industry: for which reason it is as well that we should have some idea of the diseases themselves.

The *Panama disease* caused by a Fusarium fungus was discovered in a plantation 26 years old, and thereupon the Governor and the Privy Council took action and issued rules for treatment. As a result the whole area was cut down and the plants chopped up and treated with heavy dressings of lime: a strict quarantine by means of protective fencing was at the same time maintained over the infested area. Small contiguous holdings showing traces of the disease were similarly dealt with, compensation being allowed at the rate of 6*d*. per root: the question of compensating large owners is under consideration. In the outbreak of disease at Hope Gardens ¾ acre was destroyed by fire.

Four othes diseases have been considered serious enough to be scheduled under the Diseases of Plants law for compulsory treatment: viz: (1) *Banana Rot* or *Heartleaf disease*, found to occur under conditions of extreme moisture and possessing an alarming capacity for spreading. An outbreak of this disease was entirely checked by prompt measures in cutting away infested parts and spraying with Bordeaux mixture. (2) *Bonny Gate disease* caused by a fungus attacking the roots and lower portion of the rhizome and apparently communicated from plant to plant by cutlass infection. Daily inspection of plantations was made for two months with the result that no fresh cases have been since discovered. (3) *Banana spot disease*. The effect of this disease was so disastrous and its spread so rapid that prompt steps were deemed necessary and fire was employed as the destructive agent. (4) "*Blackhead*" or "*Saltpetre*," is fairy widespread in neglected plantations and found to be caused by the well-known pineapple fungus of the sugar cane (*Thielaviopsis ethaceticus*. Went) which, as causing the coconut stem-bleeding disease in Ceylon, is specially to be feared. The occurrence of the fungus in the banana has not hitherto been recorded. It is thought that if properly treated there is no reason for apprehension from this disease.

A COMMITTEE ON RUBBER NOMENCLATURE.

Early in the sessions of the Rubber Conference a committee was appointed from the members of the Conference to act in conjunction with the committee appointed by the Rubber Club of America to bring about the standardization of the nomenclature of crude rubber. The chairman of the committee was Henry C. Pearson and the three members from the rubber club were A. Zeiss, A.W. Stedman and W. F. Bass. The members appointed from the conference were, in addition to the chairman, C. E. S. Baxendale, from Federated Malay States; Leonard Wray, from British Malaya and Straits Settlements; F. Crosbie Roles, from Ceylon; Noel Trotter, from London; Dr. Jacques Huber, from Para; Dr. J. de Argollo, from Bahia; and W. A. Anderson, from the Hawaiian Islands. *The India Rubber World, November 1, 1912.*

INTRODUCTION OF HEVEA BRASILIENSIS INTO PERAK.

Hevea brasiliensis was introduced into Perak from Singapore by Murton in October 1877. Murton mentions his visit to Perak in his Report for 1877 and states that "Liberian Coffee, Para Rubber, Brazil Rubber, and the Ceara Scrap rubber have been planted at Durian Sabatang and Kwala Kangsa." In the following year, Mr. (afterwards Sir) Hugh Low, then Resident of Perak, referred to these plants as follows, in a letter to the Colonial Secretary, Singapore, under date July 26th, 1878.

"The only plants of this description within my knowledge are one plant of what I suppose to be the Hevea and nine of the Manihots. These were brought here by Mr. Murton in October last and planted at the back of the Residency and are growing very well. They were quite small when they arrived here, but the first is about five feet high with branches of equal length, and the Manihots vary from four to eight feet and are growing vigorously. I believe Mr. Murton left plants of some kind at Durian Sabatang and at Thaiping or Matang," etc.

The original letter is quoted by Ridley (Bulletin F.M.S., IX. p. 212) who also states (Bulletin F.M.S., II, p. 3) that it appears that the Hevea at Durian Sabatang (Teluk Anson) were washed away by a flood shortly after they were planted. But what purports to be the same letter was quoted by Murton in his Report for 1878, and on comparing the two it is seen that Murton took advantage of that opportunity to correct several of Low's statements. He writes, "They (9 Heveas and 1 Castilloa) were brought here in October last by Mr. Murton," etc. He omits all reference to rubber plants at Durian Sabatang, and hence it would appear that none were planted there. He records that the coffee planted there was washed away by a flood.

It has been stated on several occasions that Low's plants were obtained from Ceylon. C. Baxendale (*India Rubber Journal*, October 12, 1912) writes, "Two cases were sent from Ceylon to the late Sir Hugh Low who planted them at Kuala Kangsar." But there is no record of any such consignment in the Peradeniya archives. Two cases of rubber plants were sent to Singapore in 1876, and a further consignment in 1877, both from Kew. Low, writing in 1896, referred to "the Hevea I received from Kew through Singapore," a statement which appears decisive on the point.

It would seem probable that the plants which Murton took to Kuala Kangsar were part of the consignment forwarded by Kew on June 11th, 1877. In that case they would be some of those collected by Cross. The 1877 consignment included 4 Ceara, 22 Hevea, and a few Castilloa. One Castilloa was retained at Singapore and another planted at Kuala Kangsar. One Ceara was also taken to Perak. What was done with the remaining Hevea, or how many survived the journey from England, was not recorded, but it would seem probable that at least one half of the consignment was taken to Kuala Kangsar.

There is of course a possibility that Low's plants had been raised from cuttings from the trees sent to Singapore in 1876, though Low's statement would appear to negative that,

It may be noted that there is nothing in the records to show that more than nine Hevea survived the journey from England, or that Singapore retained any of the 1877 consignment, though it is probable that the Heveas were shared in the same way as the Cearas and Castilloas.

T. P.

THE GARDEN PATH.

ITS UTILITY AND ITS TOO FREQUENT NEGLECT.

In every well-ordered garden, no matter what its size or attractions, if the path or paths are neglected, much of the pleasure will be lost. The path is apt to be neglected; and yet there is no more important section of the whole garden than this.

We should find it hard to estimate its worth. When the turf is too much sodden with rain to walk on or wet with a heavy dew, it is to the dry path that we turn our steps. From it we view in comfort at all seasons and in all weathers the beauties of our garden.

Of course in constructing it the question of cost has to be considered. But there are well established golden rules; and good drainage is everything to a well-made path.

Having decided where your paths shall be, or having determined to reconstruct a badly made one, start at once to get out all soil, I would advise that you go a little deeper, and insert at intervals small agricultural drain pipes to carry off any accummulation of water.

Choice of Materials.

Having got out your trench of a section of it, proceed to fill up to nine inches with large stones, brick, clinkers and the like; but avoid the addition of any soil. This will leave you with three inches before the ground level is reached,

The next step is to fix all edging or border stone; unless of course you should be using teak edging, which will be more easily fixed before the rough stone is thrown in. After having placed your edging—if your are using it—the next step depends entirely upon what you are going to use for the surface of your path-broken pavement, stone, brick (set edgeways in), asphalte, gravel or cinder.

Whichever you choose, you will require over the surface of the large stones already in the trench a layer of small stone; and the quantity will depend, in the case of a flat path, upon the thickness of the pavement or the depth of the stone or brick.

But if it is decided to use asphalte, gravel or cinder then fill up the remainder of your trench within two inches of the ground level at the sides of your path, and in the centre about one inch above the said level. Ram and roll well the surface and then apply your gravel or cinder, giving a coating of about two inches when well rolled down; you will thus have a path that will always shoot the wet and always be well drained.

It may be that your path will be less than four feet wide. If this should be you will not want it so high in the centre. Again, should you decide not to have border stone or edging of any kind, then you will

THE BRANCHING HABITS OF EGYPTIAN COTTON.

Mr. Argyle McLachlan who has contributed an article on "The Branching Habits of Egyptian Cotton" (*U. S. Department of Agriculture. Bureau of Plant Industry—Bulletin No. 249*), in concluding his paper observes that the Egyptian cotton plant bears two kinds of branches, long vegetative branches on the lower part of the stem, which bear no flower buds directly, and above these, to the top of the plant, shorter fruiting branches which bear flower buds.

The differences between vegetative branches and fruiting branches are very sharp: (1) Vegetative branches usually approximate the length of the main stem while fruiting branches are about one-third as long. (2) bear no flower buds except as they produce secondary fruiting branches. Fruiting branches bear a flower bud at each node opposite the leaf. (3) The vegetative branches, like the axis, bear fruiting branches and may bear vegetative branches. The fruiting branches rarely bear fruiting branches or vegetative branches.

Under conditions of great luxuriance extra-axillary limbs occur at some of the lower nodes which would bear fruiting branches if the development of limbs was restricted.

Egyptian cotton when planted late apparently develops more numerous vegetative branches than when planted early. Early planting is therefore advisable as a means of restricting the development of vegetative branches.

Some of the selected acclimatized types of Egyptian cotton originated in the United States bear fruiting branches at lower nodes on the stem than the stocks of imported Egyptian cotton. Selection for low fruiting gives promise of being a practical means of increasing earliness and yield.

Of the six Egyptian varieties grown in Arizona in 1909 from imported seed, Nubari most nearly resembled the acclimatized stocks in putting out fruiting branches at comparatively low nodes of the stem.

Preliminary experiments in "topping" young plants have resulted in stimulating the growth of buds in the axis of cotyledons. Branches just below the point where the plant is topped make an excessive vegetative growth and tend to assume an upright position in place of the severed axis. The topping of nearly mature plants to hasten the ripening of fruit has not yet been adequately tested.

Egyptian cotton plants grown on soil containing considerable alkali restrict the development of limbs and reject their early fruiting branches.

AGRICULTURE AT THE BRITISH ASSOCIATION.

Of the general papers, two by Dr. Hutchinson attracted considerable interest. He discribed now Lime is found to act as an antiseptic in the soil and to exert the same partial sterilisation effects as are produced by volatile antiseptics or by heat. Thus it initially kills many of the bacteria and protoza; later on there follows a very marked development of bacteria and consequent production of plant food. In the second paper experiments on nitrogen assimilation were described. It was shown that practically any plant residues added to the soil caused bacterial assimilation of nitrogen to set up, whilst sugar caused marked assimilation, particularly if the temperature was sufficiently high.—*Nature*, December 5, 1912.

HOW TO GROW CUCUMBERS.

The *Queensland Agricultural Journal* of December, 1912, contains the following:—The cucumber is not very particular as to soil, so that it be light, rich and loamy; it may be nearly all sand, provided that good rich manure be added, and that it be deeply dug. The cucumber bed should be sheltered from the westerly winds. The pits, or as some call them, hills, should be made ready in August in the following manner:—

Mark off the land in 6 ft. squares and at each intersection make a hole 2 ft. in diameter. If the soil be not naturally rich, mix with it a compost made up of well-rotted stable manure, sheep or poultry dung, wood ashes, bonedust (if procurable) and a little salt. Fill up the hole with this prepared soil and sow five or six seeds in it in a ring. Half an inch is deep enough for the seeds. When they are up take out all but two plants in each hill. Stop all lateral runners as soon as they show fruit, and the secondary runners must be pinched back to the fruit in the same manner. If the weather is dry give the beds a good soaking with diluted liquid manure about once a week. Water every evening sufficiently to damp the soil right down to the roots.

Make successive sowing during September, October and November. To produce straight cucumbers place under them three-sided boxes 3 in. wide with the open side uppermost.

A very good way of watering cucumbers to ensure the water reaching the roots is, as soon as they show signs of running, to dig a hole large enough to hold a quart can as near the roots as possible. Make holes in the bottom of the can and place it in the hole near the roots of the plant. Put the cans in the ground about 2 in. deep and fill them with water every other day.

The choicest cucumber in cultivation is Lockie's Perfection. Early White Spine, Early Ridge Gladiator and Long Prickly are also good marketing and table varieties.

Cucumbers are ready for market in from 75 to 105 days.

CROP PROSPECTS IN BURMA, 1912-13.

GROUNDNUTS.

The Commissioners of Settlements and Land Records, Burma under date of 4th November report that the area under Groundnut in the 6 principal Groundnut producing districts is estimated at 158,673 acres. Large extensions of cultivation have taken place in Pakókku, Magwe and Myingyan. The rains throughout the year have been favourable. Harvesting became general towards the end of October and is proceeding under normal conditions. The gross outturn of the Province is estimated to be approximately 66,500 tons.

COTTON.

Reporting under date of 3rd December 1912, the Commissioner says the area under Cotton, in the districts where the cultivation exceeds 1,000 acres, is now reported to be 219,998 acres. It is 35,085 acres more than the area actually cultivated last year. The rains have been favourable and crop prospects are very good. The provincial outturn of clean Cotton is estimated to be approximately 43,500 bales of 400 lbs.

RURAL HAND LABOUR AND MACHINERY.

The following extracts are from a communication by Mr. M. W. Guisset to the Association of Agricultural Engineers of Louvain which is reproduced from the "Revue Generale Agronomique" in the *Queensland Agricultural Journal of December, 1912*:—It is contestable that manual labour in agriculture is without question of better quality than work done mechanically, were it only because in manual work the intelligence of the worker always directs the energy he develops, and husbands the strength according to the necessity of the work.

It is also certain that manual work results by forming a uniform soil surface in an increased production; a gardener by the careful working of his bed gets results which if he reckoned by acres would represent enormous figures. But the actual cost of hand labour, considered in the light of acres, would not be recouped by the sale of the produce at ordinary market prices.

Consequently, the development of our primary industries compels us to perfect and carry out unceasingly the mechanical working of the land. Thus the present day farmer is obliged to sacrifice the quality of the work in order to realise the great quantity demanded by the improvement of his farm.

He has partially replaced human energy by the cheaper energy of horse-power motors; then by force of circumstances he has had to substitute inanimate machines from which he demands a thousand times more energy at a still cheaper rate.

INTERNATIONAL CONGRESS OF ENTOMOLOGISTS.

The *United Empire* of December, 1912, has the following in connection with the late International Congress held at Oxford:—There is abundant evidence that entomologists have carried their zeal and their methods to a point at which they may fairly claim international recognition in the form of international action. The two fundamental points on which knowledge is essential are (1) the condition under which any special pest multiplies fast enough to become a serious danger; and (2) the natural enemies of such pests, and the conditions favourable to them. These natural parasites are the best and cheapest means of checking any pest; and for that reason, if for no other, we may regret that the British field naturalist societies did not show more interest in the Congress. Professor Theobald declares that he has failed to find in England a single instance of any pest being controlled by its natural enemies; and considering that the particular science offers so many opportunities for joint action between amateurs and professionals, we think that enthusiastic amateurs attending the Congres might have been spurred to undertake some special investigation on these lines. Proper investigation of this question can only come from international action, directed not to the hampering of trade movements but to the study of pathological phenomena in important economic staples.

AGRICULTURAL PROGRESS IN MADRAS.

There appears to be at least one part of India in which the Department of Agriculture is exercising a marked influence upon the immemorial methods of the cultivator, says the *Indian Agriculturist.* In the concluding passage of his last Annual Report, Mr. G. A. D. Stuart, I.C.S., the Acting Director of Agriculture in Madras, states that the department is in his opinion "well on the road to realise the immense possibilities that lie before it." In explanation of this sanguine pronouncement he writes :—"Nothing more nor less than a revolution in the methods of local agriculture is to be expected. This revolution has already begun. The practices of buying fresh improved seed, of economising in seed rate, of growing green manure crops and of adopting suitable rotations are now firmly established in various tracts where they were unknown hitherto. There is nothing to prevent these and other improved methods becoming universal in course of time." Mr. Stuart makes special reference to the economy effected by a reduction in the seed rate. It has been conclusively proved, he says, in the Agricultural Station that 20 lbs. of paddy sown thinly in a seed bed is sufficient to provide seedlings for planting out an acre, and that an acre so planted will yield more than if planted in the wasteful indigenous way by which anything up to 150 lbs. of seed are used. Unfortunately Mr. Stuart does not state to what extent the economical rate of sowing has been actually adopted, and this is the crux of the matter. While the doctrine of the single seedling seems to be making headway in the Presidency, the reputation of the Department of Agriculture chiefly rests, we imagine, on the astonishing success of Cambodia cotton. This species would seem to have tohroughly established itself in the favour alike of the ryot and of the cotton buyers. Its cultivation is still spreading. The estimated crop this year in Southern Madras is computed at 80,000 bales as against 33,000 bales last year. But although Cambodia has also proved satisfactory in the northern districts in which it has been tried, it has nevertheless met with adverse influences.

A perusal of the correspondence between the department and literate ryots shows that the educated cultivating classes are coming to appreciate fully the advantages which they can obtain in the way of advice and assistance from the department. It must be added that these friendly relations are not due to the Agricultural Associations which might have been expected to act as intermediaries between the department and the ryot. Mr. Stuart hopes to form associations of real ryots, and he thinks, probably rightly, that the rural co-operative credit societies will supply the organization that is required.

THE CAUSE OF WARTS IN CATTLE.

The causes of warts are various but they are hyertrophied papillæ of the skin. Ointments and lotion are of little service for removing them. It is always best to remove them with a pair of pincers or a hot iron. In many cases, the figures are sufficient. After removal dress the wounds once or twice daily with corrosive sublimate solution—1 part to 1,000 part of water.—*Queensland Agricultural Journal.*

CO-OPERATION IN ASSAM.

THE NEW GOVERNMENT ACT.

The Indian Agriculturist of December 2, 1912, contains the following account of the Resolution of the Chief Commissioner of Assam on the Annual Report on the working of Co-operative Societies in Assam for the year ending June 30th, 1912:—

The present report is the first to deal with the Co-operative Societies of Assam alone. It contains no features of special interest, but indicates that the steady progress which has characterised the co-operative movements in this province from the beginning has continued without interruption.

The most important event of the year was the passing into law by the Imperial Legislative Council of the new Co-operative Societies' Act (II of 1912), which contains several new provisions, of which the following are the most important:—

(*a*) The registration of societies other than Credit Societies is now permissible, and the way is thus opened for the introduction of various other forms of co-operation. It appears doubtful whether any form of Co-operative Stores for urban areas is necessary or likely to prove successful in Assam; but societies for co-operative cattle insurance and for co-operative production and sale of agricultural necessities, such as manure, would appear to have a great field of usefulness if they could be introduced in a form attractive to the cultivator.

(*b*) The new Act provides for the registration of Unions, that is, of societies, the constituent members of which are other registered societies. Mr. Botham has mentioned the impossibility, under present conditions, of exercising sufficient supervision over rural societies,and the Chief Commissioner agrees with him that the solution of the difficulty lies in the development of Unions.

The Chief Commissioner agrees that in order to build up a good Reserve Fund in the early years of a Society's existence, it is advisable to charge at the outset as high a rate of interest as can be realised having regard to the rate of interest current in the locality. He is not, however, without further information prepared to concur with the Registrar in the opinion that in all cases initial deposits should not be insisted upon; he considers that every effort should be made at the formation of a society to obtain deposits from the members, and that a careful scrutiny of members circumstances might be made in order to ensure that the money deposited has not been borrowed for the purpose; where, however, such a scrutiny proves that deposits cannot be obtained without borrowing, they might be dispensed with.

TO GET RID OF ANTS.

Red ants may be driven from a house by using one-half tablespoonful of tartar emetic and the same amout of sugar dampened with a small amount of water and placed wherever this pest is troublesome.—*Queensland Agricultural Journal.*

AUSTRALIAN AGRICULTURAL COLLEGES.

Mr. B. Seth-Smith writing to the *Canterbury (New Zealand) Agricultural College Magazine* on the subject of Australian Agricultural Colleges, says that of the four colleges visited, viz., Hawkesbury (N.S.W.), Wagga Wagga (N.S.W.), Roseworthy (S.A.) and Hurlston Agricultural High School (N.S.W.), certainly Hawkesbury is the show place, and the following remarks may give some idea of what system is in vogue there. Any observant visitor must be struck at once with the extraordinary results obtained by skilful management on the very poor sandy soils on which the College is situated. Of the 3,440 acres only 150 acres, situated three milies away on the river (and recently purchased), are really good land, and this is now all under three irrigation schemes worked by electric power from the College. Perhaps no better site could have been selected for cereal experiments, as very little success could be hoped for without the most scientific methods of cultivation, and the application of artificials. One hundred acres are given up to testing from 300 to 500 varieties of cereals and fodder plants annually, 42 acres are in mixed orchard and vineyard, and 1,400 acres are usually under cultivation. Last year the vineyard (on almost pure sand) yielded dessert grapes to the value of £100 per acre. Eleven and a half tons of jam are made annually and consumed by the students and staff (300 in all).

The Dairy Department.

Some excellent lessons can be learnt here. Owing to the very light nature of the country, Mr. Potts, the Director, has found that the Kerry-Jersey cross combines the hardiness of the former with the butter-fat producing characteristics of the latter; and certainly they are very profitable looking cows, though small. A few Red Polls are used with good results and they deserve a more extensive trial.

For the first time we saw the new "Echelon" milking shed in operation. The total cost for twelve cows was £120. The chief advantages seem to be time saved in bailing cows, no leg-ropes or bails, and the ease with which new heifers are broken in. As the cows all stand on the angle, no man goes inside the stalls from the centre aisle in which the machines stand.

System of Management.

To go into detail of the system of management would take up too much space. Each student, however, unless he has obtained a certificate at Hurlston Agricultural High School, must pass an Entrance Examination for Hawkesbury, which is practically the University Entrance Examination, less languages. The very best instructors are kept, regardless of cost, which naturally makes the management very expensive. £22,000 a year seems a huge annual outlay, but when it is remembered that Hawkesbury is a show and experimental farm for the State, which is visited by many hundreds of farmers and teachers every year for instruction, and that no student is kept unless he means to work and learn, certainly the end more than justifies the means.

Regardless of expense many of the latest and most scientific agricultural implements are experimented with, and we were able to inspect the new "Mammoth" motor plough which has done excellent work on the College sandy soils. Its construction is simplicity itself, but it is very doubtful whether it will become as popular as the Petrol Tractor, which has the advantage of being less than half the price, and which adds to its work in the field its road haulage energies.

TANNIN.

POSSIBLE SHORTAGE OF RAW MATERIAL.

The investigation recently made by Mr. Puran Singh, F.C.S., into the manufacture of tannin extracts has resulted in the opinion that in tropical countries at least where forests abound in tanning materials of all kinds, the manufacture of mixed extracts is preferable to that of decolourised extracts. In the tannery, the expert tanner does not work with any one single tannin material but makes a judicious mixture of tanning materials of different colours, dark and light, in order to get his leather the right colour. The future of the tannin extract industry would appear to lie in the manufacture of mixed extracts, reduced to a standard colour sufficiently light for the purposes for which tannin is used. This procedure it is claimed would have certain advantages, for all sorts of tannin materials of different colours could be utilised for the manufacture of extracts of standard colour and strength, and the percentage of tannin in mixed extracts is higher than in similar extracts treated chemically. The objectionable colour of the mangrove bark extract, as prepared at the Government Tannin Factory in Rangoon, led to an investigation being made into the preparation of tannin extracts; and Mr. Puran Singh has embodied in his report a brief *resumé* of the general processes of tannin extract manufacture and of the factors that influence the manufacture of good extracts, together with a valuation of the mangrove barks as raw materials for tannin extracts. He doubts whether the chemistry of tannin has yet been properly investigated or understood; and he points out that while fears are entertained in Europe and America of a shortage of the raw material, the supply in the forests of the East is practically inexhaustible, and that with the increased knowledge resulting from experimental work, for which there is much scope at present, India and Burma may be regarded as the land of promise for the manufacture of tannin extracts.—*The Indian Agriculturist.*

CALABASH NUTMEG.

(*Illustrated.*)

The tree called "Calabash Nutmeg," and sometimes "Jamaica Nutmeg"—has no relation to the true nutmeg *Myristica fragrans*. Botanically it is known as *Monodora Myristica*, belonging to the Natural Order *Anonaceæ*, to which also belong the Custard Apple, Soursop, and "Wana-sapu" or Cananga. It is native of Western Tropical Africa, and has been introduced in 1897 to Peradeniya, where it is well established, but has not yet fruited. It is a slow-growing small conical tree, with large, leathery, oval glossy leaves, and bearing sweet-scented flowers. The large globular fruits contain a number of aromatic seeds, whose odour and flavour, being considered to resemble those of the nutmeg proper, are used as a substitute for the latter in the native home of the tree. Though of no economic value at present, this interesting species is worth cultivating as a useful and ornamental shade tree. It may be propagated by cuttings, and thrives best in well-drained loamy soil.

H. F. MACMILLAN.
18-12-12.

Photo by H. F. Macmillan.

CALABASH NUTMEG.

ON THE FUNCTIONS OF LIME IN THE SOIL.

Professor George Gray has contributed the following interesting article to the *Canterbury Agricultural College Magazine* of November, 1912:—

Evidence is frequently brought forward as to the beneficial effect of lime on some of our New Zealand soils, especially in the south, and it is rather astonishing considering the traditional use of lime in the Old Country, that its use is not more general here, especially when the extent of the supply and the cost of transit are considered.

Lime as a Plant Food.

Lime is one of the essential elements of plant food since it enters into the composition of the ash of all, or nearly all, our cultivated plants. Leguminous plants especially contain a high proportion in their ash, and have consequenty for a long period been termed "lime plants." The amount found in New Zealand soils is rather low, varying in soils that have come under our notice from ·12 to ·97 per cent. of calcic oxide with an average of ·47 per cent. Although the amount present is small, it is doubtful if the good effects noticed on applying lime to the soil are due in most cases to its action as a direct plant food, but to its influence in other directions.

Forms of Lime.

Since the term "lime" is applied to several different substances, it is advisable to indicate briefly the nature of these. Carbonate of lime occurs in a variety of forms, limestone, chalk, shells, coral, etc.; it is insoluble in pure water, but if the water be charged with carbonic acid gas then the carbonate is rendered soluble, the bicarbonate of lime being formed. It is this substance which renders water "hard," and there is a considerable loss of lime from the soil by such being carried below the reach of plant roots and passing away in drainage water. The old saying that "lime sinks in the soil" is, therefore, true. When the carbonate is heated the carbonic acid gas is expelled, and there remains behind calcic oxide, or quicklime, which possesses strong alkaline properties not present in the carbonate. When water is added to quicklime the chemical action evolves a considerable amount of heat, and the mass swells up and finally breaks down to a fine powder. This is calcic hydrate or slaked lime, possessing the alkaline properties of quicklime, but with the advantage of being in a more finely divided condition, thus allowing of a more equal distribution through the soil. Both quicklime and slaked lime on exposure to the air absorb carbonic acid gas from it and return to the original form of carbonate.

Function of Carbonate of Lime.

It is not the amount of lime in a soil but the form in which it exists that determines its effectiveness. In addition to being present as a carbonate it may also exist as a silicate, sulphate, phosphate or nitrate; each useful in its own way of supplying food. The carbonate, however, has further functions than this. In the natural decay of the vegetable matter present in soils, the resulting humus contains certain organic acids which give to the soil an acid reaction. This is prejudicial to the existence of the natural micro-organisms concerned in the formation of plant

food in the soil. On the soils which have come under our notice many have an acid reaction, consequently they are in an unhealthy condition as regards the existence of these essential organisms. When carbonate of lime is present these organisms do their work effectively in securing and rendering available the necessary nitrogenous plant food. This has been shown to be especially the case with Azotobacter, which is concerned in the fixation of free nitrogen from the air by leguminous plants and also with the organisms concerned in the process of nitrification; in this case it is necessary at two stages of the process, first for the formation of ammonium carbonate and afterwards for the union with the nitrous and nitric acids formed to produce ultimately nitrates.

In the absorptive and retentive properties of soils carbonate of lime plays an important part. It has been found that the salts of ammonium and potash either as sulphates, chlorides, or nitrates, when added to the soil, are not retained, but in the presence of carbonate of lime there is an interchange of acids, the stronger acids combining with the lime and the carbonic acid with the other bases, in which condition they are retained ready for the requirements of plants. On light soils carbonate of lime has the effect of compacting the soil and increasing its water-retaining capacity.

Calcic Oxide or Quicklime.

In addition to the effects produced by calcic carbonate, to which form calcic oxide always returns sooner or later, in the soil, quicklime has further functions in the soils. It assists in the breaking up of the organic matter, and liberates the plant food in a condition available for plants; on clay and heavy soils it acts on the silicates or zeolites and liberates the potash present; the influence of which is seen in the improved growth of clovers and other leguminous plants. Lime has an important influence on the mechanical texture of clay soils from the property it possesses of flocculating or aggregating together the fine clay particles, causing better drainage, less tendency to shrink and crack on drying, and at the same time rendering the soil warmer.

On insoluble phosphates such as those of iron and alumina it has been shown that lime acts by displacing these metals and forming phosphates of lime, which more readily becomes available to plants.

Calcic Hydrate or Slaked Lime.

When quicklime is placed in the soil it readily absorbs moisture and develops heat, as before mentioned, at the same time there is an increase of bulk, which tends to force asunder the soil particles and so improve the texture of the soil. The heat generated in the process also has the effect of raising the tempereture of the soil and producing earlier growth.

Application of Lime.

Soils that contain less than 1 per cent. of carbonate of lime are generally improved by the application of lime. Evidence is generally given as to the necessity for lime by the presence of such weeds as rushes, docks, etc., which have a preference for soils of an acid character, and also by the prevalence of such diseases as finger and toe, etc., in turnips, cabbages, etc. For light soils poor in organic matter carbonate of lime in the form of chalk, ground limestone, or shell sand is perferable, since such soils cannot afford to have the amount of organic matter present decreased which would be the case were quicklime applied.

An important point to be considered in the application of all forms of lime is the mechanical condition. Fineness of subdivision not only allows of better distribution through the soil, but it exposes a much greater surface for action, and consequently acts more quickly, hence the advantage of slaking quicklime before application, or having the quicklime or ground limestone as the case may be, finely ground.

It is often supposed that because manures such as superphosphate of lime contain lime, that the necessity for liming does not exist, but the action of the forms of lime mentioned is quite distinct from that of lime in superphosphate. When lime is necessary it is an advantage, other things being equal, to give preference to manures containing free lime, such as basic slag or the basic superphosphate now on the market. The old saying that:—

"Lime and lime without manure
Make both farm and farmer poor,"

is a very true one, since in order to secure the best effects from lime it is necessary to ensure a plentiful supply of plant food to meet the demand brought about by the improved condition of the soil. Where this is not done there may be truth in the saying,

"Lime enriches the father but impoverishes the son."

It was formerly the practice to apply lime at the rate of two to four tons per acre every eight or ten years, but much better results are obtained from the practice now in vogue of applying it in smaller quantities, five to ten cwt., at more frequent intervals. The effect of lime is not evident for one or two years after application since it acts but slowly in the soil.

There is considerable variation in the quality of lime dependent on the original limestone from which it is prepared, the best being obtained from limestone containing above eighty per cent. of carbonate of lime. A good criterion of the quality of lime is the time required for slaking, the more quickly it swells up and break down the better the lime. Some limestones, such as dolomite, contain considerable quantities of carbonate of magnesia, often to the extent of forty per cent. of their weight; this on burning forms magnesic oxide. Cases are on record showing the injury done to crops by the use of such lime, due to the fact that magnesic oxide retains its caustic properties much longer than calcic oxide, to the injury of plant growth.

PINEAPPLE CULTIVATION IN CEYLON.

This is the title of a booklet issued by Messrs. Freudenberg & Co., being one of a series published with a view to developing local industries, the previous publications dealing with Coconuts, Paddy, Tobacco and Cotton. The work treats of the Botany and Chemistry of the plant, varieties, climate and soil, planting, fertilising, yield and profit, packing, canning and fibre; so that the subject is exhaustively dealt with. The text which is illustrated by a number of photographic reproductions furnishes all the information that the intending planter is likely to need.

BERSEEM, OR EGYPTIAN CLOVER.

The following notes on Egyptian clover are reproduced from Bulletin 62 of the Department of Agriculture, Washington, in *The Western Mail* of December 27, 1912 :—

"Berseem is the great leguminous forage crop of Egypt, and for luxuriance and rapidity of growth is probably unequalled, and certainly not surpassed, by any crop in the world. What Egypt would have been, or would be, without this crop is difficult to conjecture. It is certainly impossible to over-estimate its importance. The growth of such heavy crops of cotton, for example, with comparatively speaking (and specially so until recently), small quantities of manure has only been possible through the renovating influences of berseem. It has, in fact, only been by the extensive growth of this crop that the maintenance of the fertility of the Egyptian soils has been possible. To state the area of the land under berseem is extremely difficult, as it not only takes its place in the ordinary rotation, but it is also used as a catch crop, one cutting, or it may be two, being taken before the sowing of cotton in the spring.

"Berseem constitutes the sole food of working animals, cows, and buffaloes, in fact all farm animals, during the months of its growth, that is to say, from a period extending from December to early in June. During the rest of the year, as already mentioned, there is almost a complete absence of green fodder, and a dry ration, composed of chopped straw, beans, barley, etc., has to be resorted to. The want of a summer forage crop which will grow without repeated applications of water is very much felt in the country. During the winter months no other forage crop is grown ; indeed, it is difficult to see how any crop could compete with it in universal uses in the country.

"There are three recognised varieties grown in the country, viz., the Muscowi, Fachl and Saidi. The former is that grown on the perennially irrigated lands of lower Egypt, and the following remarks apply to this variety.

As a Nitrogen Gatherer.

"The root system of berseem is not an extensive one, but it is most abundantly supplied with nodules. In the latter connection and as exemplifying its renovating effect on the soil it may be interesting to quote the results of analyses made last year by Doctor Mackenzie, Director of the School of Agriculture. Berseem was sold in October in two adjacent areas, A and B. On B the crop was allowed to remain for two grazings and then ploughed up in March in preparation for a cotton crop, while on area A the crop was allowed to remain for its full period of growth until June, and four crops were taken. Previous to the experiment the nitrogen content of each area was determined and also after each crop was grazed. On area B, after removing two crops, each containing 100 pounds of nitrogen the soil was enriched to the extent of practically 300 pounds of nitrogen, or, in other words, the percentage of nitrogen was increased from 0·101 to 0·110 per cent.

"When, however, as on area A the crop is allowed to run the whole course of its existence, there is no increase in the total soil nitrogen, or it is so minute as to show no difference in the percentage of soil nitrogen

present. During the latter stages of growth, therefore, it is clear that the nitrogen contained in the nodules must be drawn upon by the plant for its growth. By comparing the amount of nitrogen added to the soil by the growing of two cuttings of berseem, viz., 300 pounds, with that accepted as the increase in Europe by the growth of an ordinary clover crop, viz., 60 or 70 pounds, it is seen how valuable this forage crop is in this respect.

Other Varieties.

"In addition to the variety of berseem know as 'Muscowi,' grown in lower Egypt, a kind known as 'Fachl' is largely grown on basin lands. The seed is broadcasted on the mud as the water recedes, and as this variety is grown without irrigation one main crop only is obtained, which is usually a heavy one. It is less watery than the ordinary 'Muscowi' sort, and is generally used in making hay.

"The variety known as 'Saidi' is less luxuriant than 'Fachl.' It is somewhat of a trailing nature, and is sometimes mixed with the latter sort. It requires but little water, and is generally cut twice, though sometimes a third time. It is grown chiefly on basin lands, and is smaller in growth and less succulent than the 'Muscowi' variety.

MICROBIOLOGY IN NEW SOUTH WALES.

The second Report of the Director of the New South Wales' Government Bureau of Microbiology (for 1910-1911) is to hand. The Staff of this Department consists, besides the Director, of a Principal and three other assistants, seven Laboratory hands, three Laboratory attendants, five clerical hands and four temporary officers.

The subjects of the ivestigations carried on included (1) Infectious diseases of animals and man such as Typhoid Fever, Plague, Contagious Abortion in cows, Diphtheria, Surra, &c. (2) Pathological conditions of animal and man. (3) Parasites of animals. (4) Hygienic Examinations. (5) Diseases of plants, and (6) Economic examinations.

Under the last heading we find the results of Mr. Darnell-Smith's researches on soils, dealing with such intersting subjects as the structure of root-hairs, their relations to Osmotic pressure and the occurrence of root-nodules on leguminosæ.

Altogether this report of 244 pages (foolscap) is a useful contribution to our knowledge of the various subjects treated.

THE AGRICULTURAL DEPARTMENT OF ASSAM.

The Report of the Director for 1912 has been issued. Cotton prospects are reported to be promising, and the crop so far free from pests of any kind.

Sugar cane experiments with three Barbadoes varieties (B 376, B 147, B 208) yielded excellent results, particularly on limed lands; the first mentioned variety returning over 3½ tons of sugar per acre.

Similar success attended the potato experiments, the best results being secrued from Magnum Bonum and King of Potatoes.

It is interesting to note under Fodder crops that the following are proving the best for Upper Shillong: Maize, Khasi, Soybean, Job's tears, Langtylli grass and Sweet potatoes.

CHILAW-PUTTALAM AGRI-HORTICULTURAL SHOW.

This Show was held on the 13th and 14th December last, and was the first display of agricultural produce held in the Chilaw district.

The main pavilion was designed after that of the recent All-Ceylon Exhibition, and though, by comparison, a miniature, provided space for all the agricultural exhibits.

Separate sheds were devoted to the Fishing Industry, Agricultural Implements, Poultry and Cattle. The Ceylon Agricultural Society and Messrs. A. Baur (who represented the manure trade) occupied special kiosks, in addition to which there was a Chiefs' pavilion and a band-stand.

All these buildings were prettily set in a spacious esplandade lying between the sea and the lagoon.

The arrangements were under the direct supervision of the Assistant Government Agent (Mr. Conroy), whose efforts were ably seconded by Mr. Corea, Mudaliyar of the Pitigal Korale North, and Mr. Charles P. de Silva, Superintendent of Dankanawa Estate.

The Ceylon Agricultural Society lent the services of three Agricultural Instructors (Messrs. N. Wickremaratne, M. J. A. Karunanayake and A. Madanayka) who rendered valuable assistance.

The Director of Agriculture, the Secretary of the Ceylon Agricultural Society, and the Superintendent of the Government Experiment Stations were also present and served as judges.

For the first time the system of using serial numbers (suggested by the Director of Agriculture) was adopted, and found to facilitate the receiving and arranging of exhibits. Another innovation (also proposed by the Director) was the charging of a small entry fee for exhibits. This did not act as a deterrent; but the admission fee on the first day (Re. 1) was probably too high for a Show of this nature.

Advantage was taken of by the large number of planters and others interested in Agriculture to convene a meeting for the discussion of various Agricultural topics. This was held in the Chiefs' Pavilion and was well attended. The principal subjects on the agenda were coconuts, cotton, tobacco, dry farming and the use of Explosives in Agriculture, on all of which the Director of Agriculture spoke. At the termination of the meeting a demonstration was given in holing with dynamite.

The season was unfavourable to a good display of fruits and vegetables, and considering this fact there was no cause for complaint whether in regard to the number or quality of the exhibits. The display of coconuts was worthy of the premier coconut district of the Island.

The manufacture of cigars on the European model by Mr. Valabane of Teldeniya, and the demonstration in Sericulture by the Silk Farm at Peradeniya proved very instructive sideshows.

Native games and dances, and the presence of a band gave the necessary touch of gaiety for putting the crowd into a good humour.

It is gratifying to learn that financially also the Show was a success.

THE PLANTATION RUBBER INDUSTRY.

CLOSE *VS.* WIDE PLANTING.

The Agricultural Bulletin of the Federated Malay States contains a very interesting paper on the subject of "The Plantation Rubber Industry" read by Mr. Cyrial Baxendale at the International Rubber Conference in New York. Mr. Baxendale in dealing with the question of "Close *vs.* Wide Planting" said that he does not desire to encourage the expectation that the yields from closely planted trees will approach that obtained from those first planted. The latter were usually planted at wide distances and enjoy as much light and air as the heart of the tree can desire. Ten years ago he collected 18 lbs. of rubber in thirtyfive-days from one of the trees planted by Sir Hugh Low; while from Avenue trees of his own planting. 14 years old and 7 feet in girth, results have been obtained far in excess of those planted in the fields. It is for this reason that he is inclined to deplore references in published reports to yield per tree. All calculations should be based upon the yield per acre. Probably the average number of trees planted to the acre in Malaya is nearer 200 than 100, and thinning out is inevitable as the trees expand. Thus, their trees are an uncertain quantity, whereas the acre is always the same.

A well-known botanist who studied the Hevea in its native land used to urge us strongly to plant at 40 × 40, *i.e.*, 27 trees to the acre. The Hevea, like most quick growing trees, is extremely brittle; and at this distance would suffer severely from the wind, but if he allowed, for the sake of argument, that every tree reached maturity, he found by comparing the results from Avenue trees against the results from closely planted fields that up to 8 years old he should have harvested less than half the quantity of rubber from the same area had he adopted their botanical friend's advice.

It is true that he should have economised to a certain extent on the actual cost of collection but not sufficiently to compensate for the loss of rubber.

Thinning out as the trees get older and require more space, has been opposed on the ground that the dead roots encourage the spread of disease. He has pursued this policy for several years past and cannot find that the fear is justified. Indeed as the years roll on he becomes less anxious about plant diseases and pests of all kind. *Fomes semitostus* (our worst fungus disease) and white ants (the most destructive of our insect pests) have lost their terror for him now that he knows how to keep them in check, and as the loss from all causes on the plantations he is connected with does not average two per cent. after attaining maturity, he cannot justly be charged with "turning the blind eye" in that direction,

Labour Prospects.

The most plausible argument against the future output of plantations is that of shortage of labour. It is true that most plantations are at times short of labour, but he thinks this must generally be attributed to the manager's desire to keep down expenses. Out of a total of 227,985 coolies employed on Malayan plantations, 126,665, or rather more than half, were imported from India. The average period of service on the plantation does not exceed two years—although many of these return

after a holiday in their native land, and the difficulty is to engage during the recruiting season the exact number that are required to make good the probable departures during the rest of the year, without becoming burdened at the beginning with labour for which there is no profitable employment.

Within two years the plantation labour force has more than doubled. He does not believe that by increasing the rate of wages any great stimulus would be given to Indian emigration. Tamil coolies are more easily recruited for some plantations at half the wages paid on others which are unpopular, owing to unhealthiness or to some other cause, and this fact is becoming more clearly marked, since those employed at the lowest rates have found themselves able to remit more than half their earnings to India, and that their savings in three or four years are sufficient to establish them as capitalists when they return to their native villages.

The future success of estates which are unpopular with Indians will depend on the attractions they can offer to Chinese or Javanese. To these, the rate of wages is of more importance than any other consideration, and there is practically no limit to the number that can be recruited at a price.

It must be remembered that by doubling the cost of labour we do not double the cost of production. Generally speaking the average cost of tapping is less than one-half the total cost of production, if we include home charges; and as the majority of the trees now being tapped have barely reached half their full yielding capacity, labour rates can, if necessary, be materially increased without raising the cost of production when the trees attain maturity.

Manuring.

Recently, some consideration has been given to the question of manures. From Ceylon some interesting results have been reported, but in Malaya little has been done in this direction except on some estates where the soil is excessively rich in humus, and lime has been applied to correct the acidity, with good results.

Mr. Baxendale says that his own opinion for some years to come, at any rate, systematic cultivation of the soil will be of more value than any manure, but the experiments in Ceylon are deserving of attention, and the Agricultural Department of Malaya, if it has not already done so, might study the question with advantage.

Future Supplies.

Regarding future supplies, Mr. Baxendale said that it has been suggested to him that they will be interested in an estimate of the supplies that are to be obtained from plantation sources, and it is obvious that a paper of this kind would be incomplete without it. It is not easy to obtain reliable statistics of the cultivation in all the tropical countries in which rubber is grown. Naturally, the yields vary considerably and the high price has undoubtedly encouraged more vigorous tapping on many plantations than would have been considered advisable if the price had been less tempting. He knows fields where from 800 to 900 lbs. an acre have been collected for two or three successive years, but he questions if such high yields can be maintained. A first-class, well-managed plantation may be expected to yield an average of 500 to 600 lbs. an acre for as

many years as our experience guides us, but we must assume a considerably lower average from all plantations. The area under rubber in the Malay Peninsula at the end of 1911 amounted to 542,877 acres, and as far as I can ascertain the total area under this cultivation in the world amounts to about 1,000,000 acres. We know that during the half-year ending June 30th the exports from Malaya amounted to 9,038 tons and from Ceylon 2,252 tons. Allowing for the output from India, Sumatra, Java, etc., he estimates the total output of plantation rubber will be from 25,000—30,000 tons for the whole year. The annual increase will be fairly steady, and at about six years from date the production is likely to amount to 100,000 tons per annum, or, in other words equal the total consumption of rubber during the year ending June 30th last.

During the year ending June 30th, 1912, with rubber averaging 5*s*. 2*d*. (say 1¼ dollars) a pound, consumption—according to the figures recently published by Messrs. Hecht—increased by 25,482 tons—Mr. Baxendale is aware that this statement has been challenged by other authorities. We are told, says Mr. Baxendale, that they are eminent authorities, but as they unfortunately published their views anonymously, we are obliged to take their word for it.

POULTRY FARMING IN THE PHILLPPINES.

A resolution endorsing the plans of the Director of Agriculture to establish Poultry Farming at Alabang was passed at the meeting of the Phillippine Poultry Association on Saturday evening. Dr. C. W. Edwards, Chief of the Animal Industry Division of the Bureau of Agriculture, was appointed Chairman to select five other members to serve on the Carnival Committee and twenty applications for membership in the new organization were taken under condsideration. The meeting was well attended, the major portion of those present being Filipinos, and the discussions were both in English and Spanish for the benefit of all present.

A Committee on Constitution and Bylaws has already been appointed, and Captain George Seaver, the President of the Organization, will appoint a Committee to incorporate at an early date. The Bylaws and Constitution are to be printed both in English and Spanish and distributed among the members. The Association plans to elect Vice-Presidents, one for each province, who will organize branches to encourage and aid in the development of the poultry industry throughout the Islands, and the organization here will be made a branch of the Association in the States.

The Association is based on philanthropic principles, each member donating as much of his time and energy as he can afford to the interests of poultry raising in the Islands. All the information regarding the best methods of carrying on the business will be gathered and disseminated among the farmers, and efforts will be made to introduce high-class fowls for the improvement of local breeds.

NEW SOUTH WALES GARDENS.

The report of Mr. J. H. Maiden, Director of Botanic Gardens of Government Domains for the year 1911, is an interesting record of work containing a number of photographic illustrations, one of which shows an imposing avenue of Moreton Bay figs (*Ficus macrophylla*) planted in 1847.

In addition to the record of horticultural work, the report contains an interesting chapter on the national Herbarium and Botanic Museum, largely devoted to Fungi.

Address to the Governor

BY THE

BOARD OF AGRICULTURE.

HIS EXCELLENCY COLONEL SIR HENRY EDWARD McCALLUM, R.E., G.C.M.G.

Governor of Ceylon.

YOUR EXCELLENCY,

The members of the BOARD OF AGRICULTURE profoundly regret to learn that owing to your resignation they will not again have the privilege of meeting under the Presidency of YOUR EXCELLENCY, or continue to enjoy the support and encouragement which you have given to the great industry they represent during the term of your office as GOVERNOR OF THIS COLONY.

Our purpose to-day is not to record the fruits of your exertions in the cause of AGRICULTURE which posterity will connect with YOUR EXCELLENCY's name, but to ask you to accept this expression of our personal esteem and affection to you and LADY McCALLUM, with the hope that you may live long to enjoy the rest you have earned after your strenuous labours here.

Signed on behalf of the Board of Agriculture, Ceylon :—

L. W. BOOTH,
Acting Colonial Secretary.

S. C. OBEYESEKERE,
Lowcountry Sinhalese Member in Council.

A. KANAGASABAI,
Tamil Member in Council.

DUNUWILE DISSAWE,

R. N. LYNE,
Director of Agriculture and Organising Vice-President of the Ceylon Agricultural Society.

C. DRIEBERG,
Secretary, Ceylon Agricultural Society.

Colombo, January 17th, 1913.

HIS EXCELLENCY'S REPLY.

QUEEN'S HOUSE,
Colombo, 22nd January, 1913.

GENTLEMEN,

I thank you warmly for the beautiful address which you have presented to me on the eve of my departure and for the handsome casket in which it is enclosed. It is to be regretted that my medical advisers wil not allow me to receive a deputation from the Board as I should have much liked to make further references to different matters connected with Agriculture in which you and I are so much interested. But unfortunately that is not to be. In bidding you good-bye I can only express the earnest hope that the new Department of Agriculture will before long fulfil my highest expectations and by the harvest garnered will show that it is one of the most important factors of Government Administration. To the Department itself and to yourselves in particular I leave two legacies: Agricultural teaching and the general improvement in the condition of the goiya:—The promotion of co-operative credit societies on the lines which are having such excellent results with the toiling millions of India. The keels have been laid; let the two vessels themselves be shaped and fashioned with as much despatch as circumstances will allow so that happiness and prosperity shall be shared by the many and not confined to the few.

Lady McCallum and myself are grieved to leave you and the lovely Island in which you work and toil. In the northern climes we shall much miss the glorious sunshine which makes everything bright and beautiful in this garden colony, and in ruminating on these beauties they will always be associated with the work of your Board and of those associated with you.

Thank you again most earnestly. Farewell.

(Sgd.) HENRY McCALLUM.

THE HISTORY OF RUBBER.

HOW IT FIRST CAME TO EUROPE.

The following extract is from a lecture delivered before the Society of Arts in December of last year by Prof. F. Mollow Perkin, Ph.D., F.I.C., which appears in *The India Rubber Journal* of December 21, 1912. Of late years the importance of rubber or caoutchouc, has increased by leaps and bounds, partly owing to the enormous quantities which are employed in the manufacture of motor tyres and to the various other purposes to which rubber is now a necessary adjunct:—

Date of Discovery.

The actual date of the discovery is not exactly known, but it appears to have been employed by the Indians, probably for centuries before it was even heard of by the civilised world. The Spaniard, Gonzalo Fernandes d'Oviedo y Valdas, appears to have been the first to mention rubber in his "General Hitory of the Indies," published in Madrid in 1536. He refers to "the Indians' game of batey, which is the same as the game of ball, although played in a different manner, and the ball is made of a different substance to that used by Christians." This substance was rubber. Again, Father Xavier de Charlevoix, who lived from 1682-1761, describes the *batos*, a kind of solid ball, but extremely light and porous. "It soars higher than our balls, falls to the ground, and rebounds much higher than the level or the hand which it quitted; it falls back again and rebounds once more, although not to such a height this time, the height of the bounces gradually diminishes." During the second voyage of Columbus it was also noticed that the natives of Hayti played with balls made of the gum of a tree.

Introduction into Europe.

It appears to have been first brought to Europe by La Condamine in 1736, who went to Peru and Brazil with an expedition organised by the Paris Academy of Science to solve the question of the shape of the earth. La Condamine sent some resinous balls to Paris with the following note:— "There grows in the forests of the Province of Esmeradas, a tree called by the natives of the country hévé, from which there flows, by simple incision, a liquor white as milk, which gradually blackens and hardens in the air. The natives made flambeaux of it, which burn very well indeed without wicks and give a rather fine light..... In the Province of Quito, sheets of linen are coated with it, and are used for the same purpose as we use waxcloth..... The same trees grow along the banks of the Amazon, and the Indians call the resin which they extract *cahuchu* (caoutchouc). They made boots of it which do not absorb water, and which, after being blackened by holding them in the smoke, have all the appearance of real leather." He goes on to explain how the Indians coated bottle-shaped earthen moulds with this resin, and after it had hardened broke the moulds and forced the broken portions out of the mouth, thus making non-fragile bottles.

A little later a French engineeer, named Fresneau, who was stationed at French Guiana, described this characteristic gum and the manner in which the natives collect it, and his description is so interesting that I give it here. "They commence," he says, "by washing the foot of the tree; then they make, with a bill-hook, longitudinal but rather oblique incisions, which should penetrate the whole thickness of the bark, taking care to make them one above another, so that the flow from the top incision falls into the incision underneath, and so on, until the last one, at the bottom of which a leaf of the *balisier*, an American reed, is placed which is fixed against the tree by means of potters' earth, so as to lead the liquid into a vessel placed at the foot of the tree. To utilise the milky juice of the different trees which I have mentioned, all of which are resinous, a mould is made of potters' earth according to the shape of the vessel which it is intended to make, and, to hold it more conveniently, a piece of stick is sunk in the place which is not to be coated with milky juice. An aperture is then secured, through which the potters' earth may be afterwards expelled by introducing the water to soften it. Any one mould being shaped, polished and softened with water, it is covered all over with milky juice by means of the fingers, after which this coating is exposed to a denser smoke, where the heat of the fire hardly makes itself felt, keeping it constantly turned, so that the juice may be spread equally over the mould, and taking good care that the flame does not reach it, which would cause the milky juice to boil, and thus to form small holes. As soon as a yellow colour is seen, and this first coating is no longer tacky to the fingers, a second layer is applied which is treated in the same way, and so on with the other coats until it is judged to be sufficiently thick, and then it is kept longer over the fire so as to evaporate the whole of the moisture, until nothing but elastic resin remains..... finally, the objects will be the more substantial the greater the number of coats which have been applied. With this juice and linen sheeting, tarpaulins, pump hose, divers' clothing, bottles, sacks for containing campaigning biscuits, etc., may be made, without fear of this material imparting any bad smell; but all these things can only be executed on the spots where the trees grow, as these juices soon lose their fluidity."

Other tribes beside those in Central and South America also knew of rubber, and manufactured articles from it long before it was known to European nations. Thus the natives of Assam and some tribes on the Upper Amazon used rubber juice before the days of Columbus, to make waterproof vessels for carrying food and liquids, and gave it the name of caucho, which is probably the origin of the word caoutchouc. It is mentioned that Don José, King of Portugal, having heard of the wonderful water-proofing material used by the Indians, sent several pairs of his royal boots to Para in 1755 in order that they might be waterproofed by a covering of rubber.

Apparently rubber was not imported into Great Britain until the latter half of the eighteenth century. About 1770 Priestley recommended its use for effacing pencil marks. Hence the name of india-rubber (an Indian product used for rubbing), and this name has held to the present day.

In this year a book was published on perspective, in which the following passage is found:—"Since this was printed off, I have seen a substance

(no name is given to it) excellently adapted to the purpose of wiping from paper the marks of a black-lead pencil. It must, therefore, be of singular use to those who practise drawing. It is sold by Mr. Nairne, mathematical instrument maker, opposite the Royal Exchange. He sells a cubical piece of about half an inch for three shillings, and says it will last for several years."

In France small cubes of indiarubber were sold at the stationers' shops in 1775, but under the name of *peaux de negres* (niggers' skin).

The india-rubber bottles were imported to Europe, and in France Grossart devised a method of cutting up the bottles and making tubes and other articles useful for physical and surgical purposes.

Somewhere about the same time it was shown by Hérissant and Macquer, in a monograph addressed to the Paris Academy, that the rubber could be softened or dissolved by Dipples oil, turpentine and ether.

In 1820 an English mechanic showed how it could be cut into threads and used to replace brass wire rolled into spirals. In the same year James Hancock established the first rubber manufactory in England.

In 1823 Macintosh showed that when rubber was dissolved in coal tar naptha it could be used for making waterproof garments, and this particular form of garment took the name of the inventor, and to this day we talk of macintoshes. Shortly afterwards James Hancock, who has just been mentioned, found that by warming rubber which had previously been shredded, it could be made into thick masses and pressed into any desired form. The great difficulty which had been met with was the tackiness of rubber at elevated temperatures, and its brittleness and consequent unworkableness at low temperatures.

In order to prevent rubber goods sticking together, Hayward, an American, sprinkled it with flowers of sulphur, but although to a certain extent this was useful, it did little to alter the characteristics of the rubber. In 1839, however, a certain patent of great importance was taken out by Nelson Goodyear, claiming improvements produced in rubber by the action of sulphur. The patent, however, was not very clear, as it gave no indication regarding the proportions to be taken, or the temperatures necessary to bring about the change. About five years later, however, Goodyear gave further details, and showed that by submitting rubber first to the action of sulphur, and then raising the temperature, the rubber was neither tacky at high temperatures nor brittle at low temperatures. This process was called *vulcanization*, and the treated product *vulcanzised india-rubber*. Goodyear was also the discoverer of ebonite, which is the final product of the action of melted sulphur on rubber; Hancock, in England, appears to have discovered the process of vulcanization independently, although a year or two later than Goodyear. Parkes about the same time introduced the immersion method, in which the rubber was dissolved in carbon-disulphide, treated with sulphur chloride. Other patents followed, and since then the history of the rubber industry has been one of continual progress.

MOTOR PLOUGHS ON PADDY FARMS.

One of the few lines on which progress has been made in paddy cultivation in Siam is the introduction of motor ploughs, though at present their employment has hardly passed the experimental stage, says *the Agricultural Bulletin of the F. M. S.* The motors which are being used are oil-driven traction engines of a somewhat antiquated type, which have been adapted to their purpose by a number of ingenious, but none the less amateur, devices. Nevertheless they work well and give very little trouble. The best motors seen were of fifteen horse-power, and were used to pull heavy disc harrows, which ploughed hard clay to a depth of four inches or a little more. With these it was possible to plough two and a half acres a day. Another was a five horse-power motor which pulled a two-furrow share plough.

The cost of ploughing small fields by motor was estimated at $2 an acre, including interest on capital expenditure but not attendant's wages. Large fields, where not much time is lost in turning, can be ploughed for a little less. This is, of course, much cheaper than ploughing in the old-fashioned way with buffaloes or bullocks, and the cost could probably be reduced by using the motors which are specially made for ploughing purposes by firms in England and elsewhere.

It was hoped that after seeing the methods of motor ploughing in Siam, suggestions might be made which would lead to the employment of similar methods in Krian. When the irrigation of this district was commenced a few years ago, the Malays seem to have got the impression that a constant supply of water during the paddy season relieved them of the necessity of doing anything to the land beyond clearing it of weeds. In most places the soil is a rich clay, and it happens that much of it is so soft in nature that excellent crops can be obtained from it without ploughing. This lent support to their ideas, ploughing was never started, and now the Malays in Krian are strangers to the practice.

Not all the soil in the district, however, is of the kind mentioned. In some parts the clay, though probably rich in plant food, is too hard to enable the paddy to tiller; and in other places there is a superficial layer of peaty substance, below which the roots of the paddy cannot penetrate, and which will yield scarcely any crop at all unless it is mixed with the underlying clay. There are some thousands of acres of land of these two descriptions, and if they are to be of any use for paddy growing they must be ploughed. The owners of the land are, it is believed, gradually coming to realise this as a result of the experiments being carried on in the district, but unfortunately they are the least able of all the cultivators in Krian to bear the expense of buying buffaloes or bullocks and ploughs. If motor ploughs could be introduced into the district their use would afford a ready solution of these difficulties.

It may be urged that it would be unwise to encourage the natural indolence of the Malay by putting machines of this description at his disposal, especially as the great majority of the native holdings in Krian are small enough to be dealt with easily by a plough of the ordinary type.

The ideal system in an agricultural district divided into small holdings is for each man to do all the work that is necessary on his own plot of land. By so doing he not only reaps all the profits himself, but also acquires independence of character and habits of industry.

Government has helped to make possible the realisation of this ideal by the establishment of a system of agricultural loans, to be granted to the natives at a low rate of interest and on easy terms of repayment. These loans remove the difficulty of providing capital for the purchase of animals and implements, but the Malay is slow to take advantage of them on his own initiative, and it will probably be many years before the posssession of ploughs by the paddy planters becomes general.

RUBBER TRADE IN JAPAN.

JAPANESE RUBBER PLANTING IN MALAY PENINSULA.

According to the details which appeared in the April (1912) issue, Japanese investors to the number of 77 had, up to the previous August, acquired in Malaya about 83,750 acres of which the area of 15,800 acres had been planted. More detailed particulars, since available, show the distribution to be as follows :—

States.	Number of plantations.	Acreage rented.	Acreage cultivated.
Johore	44	77,730	12,785
Negri Sembilan ...	15	2,845	1,768
Selangor	21	1,420	880
Perak	6	1,055	480
Kedah	1	450	220
(Singapore)	2	250	120
Revised particulars to end of 1911	89	83,750	16,453

The State of Johore thus contains 50 per cent. of the number of Japanese plantations in the Malay Peninsula, as well as 93 per cent. of their total acreage and 75 per cent. of the cultivated area of its plantations. Eighty per cent. of the whole Johore acreage and 60 per cent. of the cultivated portion belongs to eight plantations. Johore is consequently the most important Malay State for Japanese rubber cultivation.—*The India Rubber World.*

A NEW FODDER.

The Kew Bulletin draws attention to *Pennisetum purpureum* or elephant grass as a fodder. It is said to be widely distributed in Tropical Africa, and to be distributed between 10° N. Lat. and 20° S. Lat. The grass is described as a tall perennial with creeping rhizomes, thriving in wet places but also growing in drier soils. The stems (culms) are generally 6 to 10 feet high, but occasionally go up to 23 feet. The leaves are 1 to 2 feet long. An analysis of the fodder shows water 61·81 % protein 2·91, and carbohydrates 17·29.

VEGETABLE OILS.

The following interesting descriptions of some Vegetable Oils is taken from the *Agricultural Ledger*, No. 5, 1911-12:—

Cotton Seed Oil.

One of the features of the Indian oil seed trade has been the rapid increase during the last few years in the exports of cotton seed. In 1898-99 the exports were 1,850 tons, in 1901-02 they rose to 11,250 tons, in 1906-07 to 219,379 tons and in 1910-11 to 299,011 tons, valued at Rs. 22,952,592 (£1,530,172 16*s.*). These large exports represent a small proportion of the amount of seed available, and illustrate the demand there is in Europe for cheap oil-yielding materials. In 1903 cotton seed at Bombay was rated at Rs. 2 4 as. (3*s.* 0*d.*) per cwt., while the wholesale prices of other oil seeds were: linseed Rs. 8 7 as. (11*s.* 3*d.*), ground-nut Rs. 7 2 as. (9*s.* 6*d*), sesame Rs. 7 (9*s.* 4*d.*), rape seed Rs. 5 6 as. (7*s.* 2*d.*).

The oil has been estimated in several samples of Indian seeds with the following results: The average of those from the Madras Presidency gave 17·41 per cent., Bombay Presidency 17·66 per cent., Central Provinces 19·65 per cent., and United Provinces 19·89 per cent. The variation in individual samples was small, being from 15 to 21 in extreme cases. The amount of oil contained in Indian seed is much less than in American, which contains upwards of 30 per cent. The Indian seed is also smaller. Specimens of American weighed 12 to 18 grams per 100 seeds, and Egyptian 10 to 11 grams, whilst Indian seed weighed only 5 to 7 grams.

Cotton seed is naturally covered with woolly hairs, and this renders it necessary to remove the husk before the oil is expressed. Such seeds are decorticated in decorticating machines or "hullers" before crushing, and the kernels or "meats" are separated from the husks by means of another set of machines called "meats and hull separators." Since the husks form 49 per cent. of the seeds and contain only a trace of oil, they leave the kernels with about 39 per cent. of oil which can be expressed with less loss than the undecorticated seeds.

Crude cotton seed oil possesses a ruby-red to almost black colour, due to the seed containing dark brown colouring matter. In order to obtain the yellow refined oil, the acid value is taken, and an amount of caustic soda corresponding to the acid is diluted with water and intimately mixed with the oil while heated to 50°. If a suitable amount of soda has been added the mixture will separate into two layers, the upper layer consisting of decolourised oil, and the lower one forming a dark-brown soap solution or "mucilage." The supernatant oil is drawn off and washed with warm water when it is ready for use.

In temperate climates cotton seed oil deposits a yellowish-white fat or "stearin" which is separated and the oil is called "demargarinated." "Cotton seed stearin" forms an article of commerce and is largely used in the manufacture of lard and butter substitutes. At the winter temperature of Calcutta (22°—24° C) very little solid fat is deposited, but by chemical means 29·5 and 32·4 per cent. of stearin were separated from oil obtained from American seed grown at Dharwar. The solid fatty acids consist of palmitic acid and probably small quantities of arachidic acid. The liquid fatty acids seem to consist of oleic and linolic acids only.

Cotton seed oil is typical of a semi-drying oil. Specific gravity at 15°, 0·922 to 0·930; solidifying point, 3°—4°; saponification value, 191—196; iodine value 106—120; Maumené test, 68 to 78; insoluble fatty acids and unsaponifiable, 95·8 to 96·1; melting point 35° to 40°; neutralisation value, 201—208; iodine value, 110—115, of liquid fatty acids, 146—149.

Cotton seed oil is readily recognised by the high melting and solidifying points of its fatty acids. There are also certain colour reactions which are employed in analysis. The Halpen colour reaction is one of the best, and is applied as follows: 1 to 3 c.c. of the oil is dissolved in an equal volume of amyl alcohol; to this is added 1 to 3 c.c. of carbon bisulphide holding in solution 1 per cent. of sulphur flowers. The test tube containing the mixture is then immersed in boiling water, and kept therein for some time. The carbon bisulphide evaporates off, and cotton seed oil gives in the course of five to fifteen minutes a deep red colouration. This reaction is very characteristic, and it is possible to detect thereby 5 per cent. or even less of cotton seed oil in admixture with other oils and fats.

Confirmation of the presence of this oil may also be obtained by the nitric acid test. This test is best carried out with nitric acid of 1·375 specific gravity. A few c.c. of the sample are shaken energetically with an equal measure of nitric acid, and the sample allowed to stand for some time up to twenty-four hours. Cotton seed oil gives a coffee-brown clouration which is characteristic of this oil to such an extent that admixtures of 10 to 20 per cent. of cotton seed oil to olive oil can be detected in certain cases.

The finer grades of cotton seed oil are used for edible purposes and in the manufacture of margarine. The lower grades are employed in enormous quantities in soap-making. On account of its drying and gumming properties the oil cannot be recommended for lubricating purposes unless it is blown. Smaller quantities of the oil are used in the adulteration of paint oils. The price of refined cotton seed oil was quoted in London (December, 1910,) at £29 to £32 per ton.

Silk Cotton Seed Oil.

(*Eriodendron Anfractuosum.*)

Under the name of Kapok oil the expressed oil from the seeds of the above silk cotton trees is used. The seeds are about the size of peas and are enclosed in a hard black shell. The oil is expressed on a commercial scale in Holland from material imported from Java; the yield of the oil from the whole seed is 17·8 per cent. on a manufacturing scale, whilst by extraction with ether 24·8 per cent. of oil is obtained. The oil is greenish-yellow or reddish coloured and has a great resemblance to cotton seed oil in its properties. Meggitt found 30·77 per cent. of oil in Bombax seeds and 4·52 per cent. of nitrogen. A sample of Semul oil from Bombay had a specific gravity of 0·9173 at 20°, and yielded crystalline fatty acids melting at 41°.

Oil of the Cashew Nut.

(*Anacardium Occidentale.*)

The kernels yield a light, yellow, bland oil. Niederstadt (1902) found the saponification value to be 179·84, and the iodine value, 60·6.

The pericarp or shell yields a black, acrid and powerfully vesicating oil. Crossley and Le Sueur determined the following constants: Specific gravity, 0·9594; saponification value, 45·1; iodine value, 294·2; Reichert-Meissl value, 1·26. Though it possessed an abnormally high iodine value, practical experiments showed it to be a non-drying oil. This particular sample had evidently suffered decomposition,

Ground-Nut Oil.

(*Arachis Hypogœa.*)

The seeds of this plant are called ground-nut, pea-nut, earth-nut, monkey-nut and Chinese-nut. Although grown here and there all over India as a garden or field crop, it is only in Madras and Bombay that the ground-nut is produced on a commercial scale. The Madras area is over 500,000 acres, and that of Bombay about 94,000 acres. On well-managed land a crop of 3,200 to 3,500 lbs. of unhusked nuts per acre may be raised. The seeds are largely used for edible purposes, while large quantities of the seeds and oil are exported from Bombay and Madras. Leather has shown that the Mauritius variety of ground-nut contains 44 to 49 per cent. of oil, while the indigenous varieties contain only 40 to 44 per cent. Newer samples have more recently been imported, and it has been noticed that they are uniformly rich in oil than the local kinds. These figures refer to the proportion of oil in the kernels. The proportion by weight of unhusked nuts to kernels is as 4 to 3. The bulk of the Indian manufacture of the oil is in the hands of owners of native rotary mills. Mills of the European pattern have been tried in South India, but they could not compete with the crude native mills as the cake from the former was too dry and powdery. Recently mills have been opened in Calcutta and elsewhere in Bengal for the manufacture of the oil and have created a large import traffic in the nuts. The nuts having been shelled the expression is carried out in two stages. The first expression is carried out at the ordinary temperature, and the cold drawn oil is nearly colourless, has a pleasant taste and is used as a salad oil. The second expression is made at a temperature of 30° to 32° and yields an oil suitable for edible purposes and for burning. Sometimes a third expression is made at a higher temperature and gives a turbid oil suitable for soap making. Arachis cake contains the highest amount of proteins of all known oil-cakes. That from non-decorticated nuts contains 5·35 per cent. of nitrogen and 0·9 per cent. of phosphoric acid, and that from the kernels contains 7·9 per cent. of nitrogen and 1·35 per cent. of phosphoric acid.

Arachis oil has the following constants: Specific gravity at 15°, 0·917 to 0·920; solidifying point; about zero; saponification value, 185·6 to 194·8; iodine value 83·3 to 100; Reichert-Meissl value, 0·0; Maumené test 49°. Insoluble fatty acids and unsaponifiable, 94·87 to 95·86; melting point 22° to 29°; iodine value 95·5 to 103·42; mean molecular weight, 281·8.

Arachis oil can be identified and detected by the isolation of arachidic acid, a constituent melting at 74·5°. About 10 grms. of the oil is saponified, neutralised and treated with lead acetate. The lead salt is extracted with ether and the insoluble portion is decomposed and the fatty acids dissolved in 50 c.c. of 90 per cent. hot alcohol. On cooling the alcoholic solution a crop of crystals will be obtained which should amount to 5 per cent. of the oil and melting between 74° and 75·5°.

Gingelly Oil.

(*Sesamum Indicum.*)

Til, sesame or gingelly oil is one of the most valuable Indian vegetable oils; it keeps for a long time without becoming rancid and is produced in large quantities in almost every part of the Peninsula. The area under which it is cultivated is about 4,000,000 acres, in addition to over 500,000 acres where it is grown as a mixed crop; the yield in tons is about 300,000. Bombay exports almost the entire quantity produced in the various provinces, Marseilles taking the largest consignment. The seed is somewhat

smaller than linseed, and is white, black, red or brown in colour. Regarding the amount of oil in the seed, Leather found that the variation is from 48 to 52 per cent. though some specimens contained as much as 56 per cent. and some as little as 45 per cent. These differences appear to be independent of variety, province or climate. From 42 to 48 per cent. of oil may be obtained by expression. The seeds also contain about 3 per cent. of nitrogen and the cake is an excellent cattle-food. If made from unsound seed the cake may be used as a manure.

Sesame oil has been frequently examined by chemists, and the following average constants are quoted: specific gravity at 15°, 0·923 to 0·926; solidifying point.—5°; saponification value, 187·6; iodine value, 103 to 115; Reichert-Meissl value, 1·2; Maumené test, 63° to 65°; butyro-refractometer at 25°, 68·0; insoluble fatty acids and unsaponifiable, 95·7; melting point, 25° to 30°; neutralisation value, 196 to 201; mean molecular weight, 286.

Sesame oil contains, according to Farnsteiner, 12·1 to 14·1 per cent. of solid acids, and according to Lane 78·1 per cent. of liquid fatty acids. These consist of oleic and linolic acids. Sesame oil is dextro-rotatory, a property which may be used as an additional means of identifying the oil. The Indian oil has a lower rotation than African. The amount of unsaponifiable matter in sesame oil varies from 0.95 to 1.32 per cent. and contains. phytosterol, sesamin and a so-called red oil. The phytosterol recrystallised from alcohol melts at 139°-139·2°. In 1891 Tocher extracted from the oil, by means of glacial acetic acid, a crystalline substance named sesamin. This melts at 118° and assumes a green and then bright red colour with nitro-sulphuric acid. An extremely characteristic colour reaction, called Baudouin's test, is now used to detect the presence of sesame oil in mixtures with other oils. The test is applied as follows: Dissolve 0·1 grm. of sugar in 10 c.c. of hydrochloric acid of specific gravity 1·19 in a test tube, add 20 c.c. of the oil to be tested, shake thoroughly for one minute and allow to stand. The aqueous solution separates readily, and in the presence of even the smallest quantity of seasame oil it will be found coloured crimson.

Coconut Oil.

(*Cocos Nucifera.*)

Coconut oil constitutes the most important in quantity and value of all the oils exported from India. During the past three years the amount has been on the average 2,500,000 gallons and the value Rs. 3,750,000 (£250,000), this represents one-half of all the vegetable oils sent out of the country. The coconut palm grows most abundantly along the Malabar Coast, and the oil produced in Cochin has maintained a very high reputation in the market for many years. The oil was originally prepared by boiling the kernels with water and skimming off the oil, a considerable quantity was also made in crude native mills by expression, but during latter years modern machinery has been introduced such as is used in Europe. The use of freshly dried kernels ensures the production of an oil containing little acidity.

Coconut oil is light coloured with a bland taste and a peculiar but not unpleasant odour. In the winter months when the temperature falls to 22° to 24° it solidifies to a white fat. The oil may be easily purified, and in this state it forms a favourite edible oil. Coconut oil is used in enormous quantities in the manufafcture of soaps, made by the boiling process,

as also by the cold process; the crystalline character of the fat renders it suitable for toilet preparations. The oil is employed extensively as a vegetable butter and as a chocolate fat. Coconut oil resemles palm oil in its chemical composition; like the latter it contains large proportions of trimyristin and trilaurin, smaller quantities of the palmitin, tristearin, and triolein, as also the glycerdies of the volatile acids caproic, caprylic and capric. It is practically free from hydroxy acids (Lewkowitsch), and free from butyric acid.

Crossley and Le Sueur (1889) obtained the following constants in oils received from Malabar, Bengal and Bombay; Specific gravity at 100°, 0·903 to 0·904; acid value, 9·9 to 35·2; saponification value, 255·5 to 258·2; iodine value, 8·25 to 8·54; Reichert-Meissl value, 6·65 to 6·79; melting point, 23·5 to 25.0 insoluble fatty acids, 82·35 per cent.

Coconut oil is rarely adulterated with other fats, and the above tests are usually sufficient for its recognition. It may be remarked that this oil has a great resemblance to the oil obtained from the kernels of the palm tree (*Elæis guineensis*) of the West Coast of Africa.

Candle-Nut Oil.

(*Aleurites Moluccana.*)

The candle-nut tree is distributed over the tropics of the Eastern hemisphere, and is found naturalised in many parts of India. Throughout the Malayan Archipelago the nuts are an article of export. The fruits resemble ordinary walnuts in appearance, and are called *jangli akrot* or wild walnuts. They consist of two-thirds of shell and one-third of kernel; the kernels contain 60 or more per cent. of oil. The cold-drawn oil is limpid, colourless or yellowish, has a pleasant odour and bland taste, but cannot be used for edible purposes on account of its purging properties. It is a good but rather slow-drying oil, and is prized for burning, lubricating and soap-making. Its constants, according to Dunstan and Lewkowitsch, are: Specific gravity, ·9274, ·9256; saponification value, 204·2, 192·6; iodine value, 139·7, 163·7; titer test of fatty acids, 17·8°, 21°.

The tree has been recommended for planting in avenues and the seed as a source of drying oil.

Physic Nut Oil.

(*Jatropha Curcas.*)

An evergreen shrub, indigenous to America, but cultivated in most parts of India. The Physic nut, Vern.—*Bag-berenda, safed arand, rattan-jot.* The seeds yield about 34 per cent. of oil and the kernels about 52 per cent. The oil is yellow when fresh, becoming reddish on exposure to the air; it has an unpleasant odour, and strong purgative properties, more pronounced than those of castor oil. Curcas oil yields about 10 per cent. of solid fatty acids melting at 57·5°; the liquid fatty acids consist of about equal proportions of oleic and linolic acids. The specific gravity is 0·919 to 0·921; saponification value, 193·2; iodine value, 98·3 to 104·9; Reichert-Meissl value, 0·55; Maumené test, 65 to 68°. The fatty acids (95·5 per cent.) melt at 24—26°; iodine value, 105.

The oil is used in medicine, for soap-making and as illuminant; it has considerable drying properties, though not so good as those of cotton seed oil.

JOHN FERGUSON, C.M.G., F.R.C.I., Etc.

The subject of the following notice will be known to many readers of this Journal, of which he was the founder, and the editor for many years. Born in 1842 in Tain, Scotland, Mr. Ferguson's early training was for a journalistic career. He arrived in Ceylon in 1861 to join the *Colombo* (now the *Ceylon*) *Observer*. For years he continued as Editor of that paper which he enlarged and developed from a bi-weekly into a daily. When he gave up active work, he was the doyen among newspaper editors in Asia, and though now absent from Ceylon his connection with the Island's press is not yet severed. In June, 1881, he founded the *Tropical Agriculturist*, which he edited for twenty-five years, and since 1863 till a year or two ago was responsible for the Annual "Ceylon Handbook and Directory" which, *inter alia*, contains the fullest Statistics in reference to the planting enterprise of the tropical world. Mr. Ferguson's interest has always been evinced in anything calculated to advance the Island's prosperity. No one took a more active part in agitating for Railway and Road extensions, both by writing in his own newspaper as well as in preparing Memorials to the various Secretaries of State, and while on leave by personal interviews at the Colonial Office. His offices in this direction have frequently been publicly acknowledged by the Planting Community. For instance, at a meeting of the Kelani Valley Planters' Association in 1907 the following Resolution was passed:—"That this Association supports the Hon. Mr. John Ferguson in his outspoken and able speech in the Legislative Council as regards the policy of the Ceylon Government with reference to the Extension of the Railway to Ratnapura."

Always fond of travel, Mr. Ferguson has made several trips round the world, in the course of which he has lectured on Ceylon, on its Tea Industry and its attractions to visitors, especially in London and through the Southern States of America. In respect of Rubber Cultivation, Mr. Ferguson has been connected with its development from the beginning, for, while the first Para rubber plants were brought from Kew to Huntingdon Gardens in 1876, so early as 1883 Mr. Ferguson compiled and published from the *Observer* Press a Planter's Manual entitled "All about India Rubber and Gutta-percha," preparing and issuing a second edition in 1887 and a third in 1899. He has also written Manuals on Tea, Coffee, Coconuts, Cocoa, Spices, Fibres, Palms, while his Illustrated Handbook on Ceylon has run into several editions. In 1903 Mr. Ferguson's services to the Island were recognised, when on the recommendation of His Excellency Sir West Ridgeway he was made a Commander of the Distinguished Order of St. Michael and St. George. For five years he represented the General European Community in the Legislative Council of Ceylon, and in 1904 attended the St. Louis Exhibition as an Official Visitor from the Ceylon Government. He has been President of the Ceylon Branch of the Royal Asiatic Society, Vice-President of the Ceylon Agricultural Society, and in various ways has played a conspicuous part in the Island's history during the past fifty years.

F. Crosbie Roles, F.J.I., F.R.C.I.

MR. FRANCIS CROSBIE ROLES, F.J.I., F.R.C.I.

Francis Crosbie Roles, F.J.I., F.R.C.I., born 1867, was articled to Journalism in England, and came out to Ceylon when twenty-one years of age as chief reporter to the *Ceylon Independent*, then edited by the late Mr. George Wall. Mr. Roles visited England in 1893, returned to the Island in 1895, as sub-editor of the *Times of Ceylon*. He was appointed leader-writer in 1897 and became partner in 1900. Mr. Roles has had joint charge of the *Times of Ceylon* Establishment ever since. He was treasurer of the Ceylon Branch of the Royal Asiatic Society for eleven years, and is a life member of that body. A member of the old National Association of Journalists of Great Britain and Ireland, Mr. Roles became an original member of the Institute of Journalists on its formation in 1889, and was elected a fellow in 1901. He is also a life fellow of the Royal Colonial Institute. He represents the *Central News* (London). In 1896 he married, in New York, the only daughter of the late Mr. John R. Nichols, a lawyer of that city, and has twice since visited America. On one of these occasions, in 1904, he was an official visitor for Ceylon at the St. Louis World Fair. Mr. Roles drafted the original of the Foreign Press-Messages Copyright Ordinance of 1898, which affords forty eight hours' protection. He contributed to the second edition of "The Law and the Press." He has given much study to the subject of Rubber cultivation, has published a brochure on this industry, and is a director of more than one Company. In 1908 Mr. Roles was deputed to visit Burmah with a view to arranging for an improved rice supply to Ceylon Estates and was delegate to the 1st Imperial Press Conference in 1909. In 1912 he was appointed Ceylon Commissioner to the New York Rubber and Allied Trades Exhibition.

OUTTURN OF RAW COTTON IN THE PUNJAB.

It is satisfactory to learn that the outturn of raw cotton in the Punjab this year is likely to exceed considerably that of 1911. The area under crop is 1,362,200 acres—an increase of nearly 40,000 acres; and only in the unirrigated lands in the three northern divisions is the prospect poor. As, however, these represent only one-tenth of the area cultivated the matter is not serious. The main increase is in the Delhi, Jullunder and Lahore Divisions where good rain fell at sowing time. The damage from boll-worm is said to be negligible—an important consideration for the cultivator.

ERRATUM.

On page 38 under head "Chilaw-Puttalam Agri-Horticultural Show," para 5, last line, instead of Chas. P. de Silva *read* Chas. A. Peiris, J.P., U.P.M., etc., etc.

MARKET RATES FOR TROPICAL PRODUCTS.

(From Lewis & Peat's Monthly Prices Current, London, 4th December, 1912.)

	QUALITY.	QUOTATIONS.
ALOES, Socotrine cwt.	Fair to fine ...	62s 6d a 67s 6d
Zanzibar & Hepatic ,,	Common to good ..	40s a 75s
ARROWROOT (Natal) lb.	Fair to fine .	8d a 9d
BEES' WAX, cwt.		
Zanzibar Yellow ,,	Slightly drossy to fair .	£6 17s 6d a £7
East Indian, bleached ,,	Fair to good	£8 a £8 5s
,, unbleached ,,	Dark to good genuine ..	£5 17.6 a £6 10s
Madagascar ,,	Dark to good palish	£6 15s a £7 2s 6d
CAMPHOR, Japan ,,	Refined	1s 5½d a 1s 8d
China ,,	Fair average quality ...	167s 6d
CARDAMOMS, Tuticorin	Good to fine bold	5s 2d a 5s 8d
	Middling lean	4s 6d a 4s 11d
Malabar, Tellicherry	Good to fine bold ..	5s 1d a 5s 7d
Calicut	Brownish ..	4s 6d a 4s 11d
Mangalore ,,	Med brown to fair bold	4s 9d a 6s
Ceylon, Mysore ,,	Sm all fair to fine plump	4s 3d a 6s
Malabar .	Fair to good ...	3s 7d a 3s 10d
Seeds, E. I, & Ceylon ,,	Fair to good .	1s 6d a 4s 9d
Ceylon Long Wild ,,	Shelly to good ..	1s 2d a 3s 2d
CASTOR OIL, Calcutta ,,	Good 2nds .	3½d
CHILLIES, Zanzibar cwt	Dull to fine bright ...	40s a 45s
Japan ,,	Fair bright small ..	30s a 32s 6d
CINCHONA BARK.—lb.	Crown, Renewed	3½d a 7d
Ceylon	Org. Stem	2d a 6d
	Red Org. Stem	1½d a 4½d
	Renewed	3d a 5½d
	Root	1½d a 4d
CINNAMON, Ceylon 1sts	Good to fine quill	1s 3d a 1s 7d
per lb. 2nds	,, ,,	1s 4d a 1s 6d
3rds	,, ,,	1s a 1s 5d
4ths	,, ,,	1s a 1s 4d
Chips, &c..	Fair to fine bold	2d a 4d
CLOVES, Penang lb.	Dull to fine bright pkd.	9s a 1s 2d
Amboyna ..	Dull to fine	9d a 10d
Ceylon ..	,, ,,	8½d a 9d
Zanzibar	Fair and fine bright	9½d a 10d
Stems ..	Fair	3½d
COFFEE		
Ceylon Plantation cwt.	Medium to bold	Nominal
Native	Good ordinary	Nominal
Liberian ,,	Fair to bold	85s a 90s
COCOA, Ceylon Plant. ,,	Special Marks	77s a 90s
	Red to good	72s a 76s 6d
Native Estate ,,	Ordinary to red	42s a 70s
Java and Celebes ,,	Small to good red	25s a 82s 6d
COLOMBO ROOT ,,	Middling to good	12s a 19s
CROTON SEEDS, sift. cwt.	Dull to fair	70s a 80s
CUBEBS ,, ,,	Ord. stalky to good	150s a 170s
GINGER, Bengal, rough ,,	Fair	35s nom.
Calicut, Cut A ,,	Small to fine bold	78s a 85s
B & C ,,	Small and medium	55s a 73s
Cochin Rough ,,	Common to fine bold	34s a 40s
	Small and D's	33s
Japan ,,	Unsplit	25s
GUM AMMONIACUM ,,	Ord. blocky to fair clean	40s a 72s 6d
ANIMI, Zanzibar	Pale and amber, str. srts	£12 10s a £14 5s
	,, ,, little red	£11 a £12
	Bean and Pea size ditto	75s a £9 12s 6d
	Fair to good red sorts	£7 a £10
	Med. & bold glassy sorts	£5 a £8
Madagascar ,,	Fair to good palish ...	£4 a £8 15s
	,, ,, red ...	£4 a £7 10s
ARABIC E. I. & Aden ,,	Ordinary to good pale	33s a 37s
Turkey sorts ,,		33s a 65s 6d
Ghatti ,,	Sorts to fine pale ...	25s a 35s nom.
Kurrachee ,,	Reddish to good pale ...	25s a 30s ,,
Madras ,,	Dark to fine pale ..	25s a 30s ,,
ASSAFŒTIDA ,	Clean fr. to gd. almonds	£10 a £12
	com. stony to good block	60s a £9
KINO	Fair to fine bright	6d a 1s 5d
MYRRH, Aden sorts cwt	Middling to good	50s a 60s
Somali ,,	,, ,,	45s a 47s 6d
OLIBANUM, drop ,,	Good to fine white	45s a 50s
	Middling to fair	35s a 40s
pickings ,,	Low to good pale	12s 6d a 27s 6d
siftings ,,	Slightly foul to fine	20s a 22s 6d
INDIA RUBBER lb.	Fine Para bis. & sheets	4s 3½d
	,, Ceara ,, ,,	4s
Ceylon, Straits,	Crepe ordinary to fine..	4s 4d a 4s 5d
Malay Straits, etc.	Fine Block ..	4s 5½d
	Scrap fair to fine ..	3s 6d a 3s 9d
Assam	Plantation ..	3s 5d
	Fair II to ord. red No. 1	3s 2d a 3s 6d
Rangoon	,, ,, ,,	2s a 2s 11d

	QUALITY.	QUOTATIONS
INDIARUBBER.*(Contd.)*		
Borneo	Common to good ..	1s 9d a 2s 8d
Java	Good to fine red ..	2s 9d a 3s 3d
Penang	Low white to prime red	1s 1d a 2s
Mozambique	Fair to fine red ball ...	3s 6d a 4s
	Sausage, fair to good .	3s 5d a 3s 11d
Nyassaland	Fair to fine ball ..	3s a 3s 6d
Madagascar	Fr to fine pinky & white	2s 6d a 2s 9d
	Majunga & blk coated ..	1s 10d a 2s 4d
	Niggers, low to good .	6d a 2s 9d
New Guinea	Ordinary to fine ball ..	2s 3d a 2s 9d
INDIGO E.I. Bengal	Shipping mid to gd violet	3s a 3s 6d
	Consuming mid. to gd.	2s 3d a 2s 10d
	Ordinary to middling	2s a 2s 2d
	Mid. to good Kurpah	1s 10d a 2s 5d
	Low to ordinary	1s 6d a 1s 9d
	Mid. to fine Madras	None here
MACE, Bombay & Penang	Pale reddish to fine	2s 6d a 2s 8d
per lb.	Ordinary to fair	2s 2d a 2s 4d
Java	,, ,, good pale	2s 4d a 2s 8d
Bombay	Wild	7d a 8d
NUTMEGS— lb.	64's to 57's	10d a 1s
Singapore & Penang ,,	80's	7½d
	110's	6½d
	100's to 115's	5d
NUTS, ARECA cwt.	Ordinary to fair fresh	14s a 15s
NUX VOMICA, Cochin	Ordinary to good	9s 6d a 12s 6d
per cwt. Bengal	,, ,,	9s
Madras	,, ,,	9s a 9s 6d
OIL OF ANISEED ,,	Fair merchantable	6s 11d
CASSIA ,,	According to analysis	3s 7d a 3s 9d
LEMONGRASS ,,	Good flavour & colour	4d
NUTMEG ,,	Dingy to white	1½d a 1¾d
CINNAMON ,,	Ordinary to fair sweet	2½d a 1s 5d
CITRONELLE ,,	Bright & good flavour	1s 6d
ORCHELLA WEED—cwt.	Fair	
Ceylon ,,	Fair ...	10s Nom.
Madagascar ,,	Fair ...	10s ,,
Zanzibar ,,	Fair ...	10s ,,
PEPPER—(Black) lb.	Fair	
Alleppy & Tellicherry	,, to fine bold heavy ..	5½d
Ceylon ,,	Fair	5½d a 5½d
Singapore ,,	Dull to fine	5½d
Acheen & W. C. Penang	Fair to fine	5½d a 5½d
(White) Singapore ,,	Fair	8½d a 9d
Siam ,,	Fair	8½d
Penang ,,	Fair	8d
Muntok ,,	Ordinary to good ..	9½d
RHUBARB, Shensi ,,	Ordinary to good ..	1s 11d a 3s 3d
Canton ..	Fair to fine flat ..	1s 8d a 2s 2d
High Dried..	Dark to fair round ..	1s a 1s 3d
	Fair to fine	10d a 1s
SAGO, Pearl, large ...	,, ,,	18s a 19s
medium ..	,, ,,	17s a 18s 6d
small ...	,, ,,	15s a 16s
Flour ..	Good pinky to white ...	12s a 14s.
SEEDLAC cwt.	Ordinary to gd. soluble	55s a 65s
SENNA, Tinnevelly lb.	Good to fine bold green	5d a 8½d
	Fair greenish	3d a 4½d
	Commonspeckyand small	1½d a 2½d
SHELLS, M. o'PEARL—	Small to bold ...	90s a £10 15s
Egyptian cwt.	,, ,, ...	90s a £10 7s 6d
Bombay ,,	Unsorted	£9
Mergui ,,	Fair to good £	11 10s a £14 17/6
Manilla ,,	Sorts	80s a 85s
Banda ,,	Small to large ...	60s a 82s 6d
Green Snail,,	trimmed selected small	
Japan Ear ,,	to bold	65s a £11
TAMARINDS, Calcutta...	Mid. to fine bl'k not stony	9s a 12s
per cwt. Madras	Stony and inferior ..	4s a 5s
TORTOISESHELL—		
Zanzibar, & Bombay lb.	Small to bold ..	11s 6d a 25s
	Pickings ..	14s a 19s
TURMERIC, Bengal cwt.	Fair ..	22s nom
Madras ,,	Finger fair to fine bold	22s a 24s
Do. ,,	Bulbs [bright	18s a 20s
Cochin ,,	Finger fair ..	21s
	Bulbs ..	13s
VANILLOES— lb.		
Mauritius 1sts	Gd cry stallized 3½ a 3¾in	11s 6d a 18s
Madagascar ... 2nds	Foxy & reddish 3½ a ,,	11s a 14s 6d
Seychelles .. 3rds	Lean and inferior ...	10s a 11s
VERMILLION ..	Fine, pure, bright ...	2s 11d
WAX, Japan, squares	Good white hard ...	147s

THE SUPPLEMENT TO THE

Tropical Agriculturist and Magazine of the C. A. S.

No. 1.] JANUARY, 1913. [Vol. XII.

COCONUTS AND COCONUT PRODUCTS AND CULTIVATION IN 1912.

AND CURRENT PROGRESS.

Taking into consideration the several years of short rainfall which preceded 1912, those interested in coconuts had not much to complain about the returns they received from the "greatest industry" in Ceylon.

Coconut crops were fairly good and the prices obtained for copra were better than in 1911. The prices for copra ranged between R82 per candy in January and R88 for a day or two in December. The average price for copra during the year was about R85·50 per candy.

The prices of desiccated nut during the year fluctuated between 24 cents per lb. at the commencement of the year to 20 cents when the year closed. The price of this product seemed to fall during the latter half of the year, while the price of copra was rising. The price of the former product bore no proportion to that of the latter. In consequence, nuts did not come to the mills as freely as they should have come. That they did come at all—when the difference between 1,000 nuts and a candy of copra ranged in price between R20 and R30, according to where the desiccating mills were situated—is due to the fact that the outturn of nuts was poor, and copra dealers were rather shy in consequence about purchasing nuts. A second reason is that owners preferred to sell to the mills as they realise at once, while if nuts are converted into copra there is a long wait; the same if sold to copra dealers. In the favourite coconut districts of the North-Western Province, where the quality of the nuts is always good, the average difference in price between the price of nuts and of copra was about R15—R20, while inland, in the Western Province, the average difference in price was between R20—R30.

The outturn of Copra and Desiccated Nut from coconuts was very poor for the first half of 1912. Thence it began to improve in consequence of the rains that had fallen during the second quarter of the year and improved still more during the season of small crops.

Only those who are not experienced coconut planters will permit themselves to state that the rains of the past two months will benefit the crops of the current year. The very favourable rains during 1912 will improve the outturns during 1913 and the crops of 1914.

Cultivation of coconut properties, even those in the hands of small peasant proprietors, is becoming general north of Colombo in the Western and North-Western Provinces. It is not general in other parts of the Western Province and in the sea-borde of the Southern Province. Where there has been cultivation, increase of crops will result this year.

The question of spacing was one subject discussed at the Conference of those interested in coconuts called together by Mr. Lyne. He remarked that coconut trees were planted very close in the Southern Province. This is noticeable also at the southern end of the Western Province. Most of these trees are used for toddy. The yield of this product cannot be large from individual trees, as the flower-spathes thrown out by these closely-planted trees are few and attenuated.

In calculating the annual yield of coconuts during any one year for the Island, has any estimate been made of the number of nuts which toddy represents?

Till the Railway can make satisfactory arrangements to deal with the copra that now goes by Boat from North of Colombo, the Railway will lose this important source of income. The convenience of transport by boat is, that copra is sent loose. To "bag" it requires the purchase of bags and the cost of bagging. A

free current of air passes through copra in boats and very little is lost in driage. Most important of all, boats take copra direct to the mart where it is sold. It the Government be alive to its interests, they will construct specially ventilated trucks for copra with loose planks to be slid into position horizontally in place of hinged doors. This will permit of those paying for a full truck being allowed the concession of sending their copra loose. The Railway must also have a special store for copra somewhere near Urugodawatte crossing, where a mart will be established, and from where purchasers can remove copra to their stores either by boat or cart, as is most convenient. If the preceding suggestions are carried out, the Railway will be able to attract the copra traffic of at least the estates.

We have received information that several complaints had been made to the Traffic Superintendent of the Railway that the staff of coolies attached to the goods-shed at Negombo are boys who cannot deal with heavy packages, not even with cases of Desiccated Coconut, and that in consequence consigners had to engage coolies to do this work and are now avoiding the Railway. We bring this prominently to the notice of His Excellency the Governor.

The exports last year were 589,900 cwt. of copra representing 153,397,400 nuts at 1,300 nuts to the candy, 30,613,411 lb. desiccated nuts representing 107,146,938 nuts at 3½ nuts to the pound, as the nuts were inferior during the better part of last year, and 15,619,811 nuts representing a grand total of 276,164,149 nuts. To this must be added the number of nuts consumed locally and what toddy represents, to find out the total coconut crop of the Island for 1912.—We quote the following table from our contemporary though it differs from Chamber of Commerce returns :—

EXPORTS FROM COLOMBO AND GALLE 1901-1911.

	Coconut oil.	Copra.	Desiccated coconut.	Coconut poonac.	Coconuts.
	Cwts.	Cwts.	Lbs.	Cwts.	No.
1901 ...	453531	439865	14055493	204356	14850781
1902 ..	512498	374796	16227565	247697	12588212
1903 .	665357	721575	17485369	299972	13129349
1904 ...	499632	714295	18728915	245759	169 7621
1905 ..	594831	393309	20779236	270703	18047718
1906 ...	539070	451134	20213570	259125	16013510
1907 ..	477996	385156	2330 497	228199	13818147
1908 ..	670121	768795	27410230	304642	21188692
1909 ...	581478	772032	25978844	253709	18135658
1910 ...	616377	766908	27201074	309589	16114088
1911 —	495466	782034	31885290	207527	1526:723
1912 —	371676	589990	30613411	162616	15619811

PUBLIC SALES OF TEA, 1912.

IN COLOMBO.

		Offered. lbs.	Sold. lbs.	Average Price. 1912. cts.	Average Price. 1911. cts.
Jan. 4	...	2829622	2516615	46	46½
,, 9	...	1046211	959720	46	45½
,, 10	...	1896482	1706804	46	46
,, 23	...	1767911	1515043	46	45
,, 30	...	1343864	1181224	46	46
Feb. 6	...	1150916	889900	47	47
,, 13	...	1287446	1045441	49	48
,, 20	..	1455276	1186465	47	49½
,, 27	..	1481595	1238086	48	48½
March 5	...	1442705	1204615	48½	48
,, 12	...	1408449	1034174	48	47
,, 19	...	1641879	1271650	47	48
,, 26	...	1700907	1289897	46½	47
April 2	...	1733966	1296586	46	48
,, 16	..	2854710	2182079	45	46¾
,, 23	...	1745375	1412154	44¾	48¾
,, 30	...	1453702	1257951	45	46
May 7	...	1785075	1447254	44½	44
,, 14	...	1968784	1581580	44	43
,, 21	...	1750540	1331507	43½	43½
,, 29	..	2373015	1869887	42	43
June 4	...	2376587	1725715	41	44
,, 11	...	1910397	1500751	43½	43
,, 18	...	1880174	1346139	41	44
,, 25	...	2082577	1447709	41½	42
July 2	...	2086454	1619522	40½	42½
,, 9	...	1970068	1443488	42	44
,, 16	...	2057300	1528123	41	43½
,, 23	...	1980145	1498098	41	43½
,, 30	...	1717806	1357923	42	43
August 6	...	1338057	1104756	43½	44½
,, 13	...	1354892	1169014	45½	44½
,, 20	...	1452261	1197986	46	45
,, 27	...	1413477	1154156	47	46
Sept. 3	...	1399822	1107676	50	46
,, 17	..	2262653	1835723	46¾	45½
,, 24	...	1318788	960589	45½	44½
Oct. 1	...	1351311	984529	46	46
,, 8	...	1417900	1167843	46	45
,, 15	...	1287976	1004612	46	45
,, 22	...	1475533	1306239	46	45
,, 29	...	1443413	1319069	46	47
Nov. 5	...	1461566	1265298	48	46½
,, 2	...	1250034	931294	47¼	47½
,, 19	...	1503037	1241721	46	45
,, 26	..	1559344	1108812	45	46½
Dec. 3	...	1360355	966331	46½	46
,, 10	...	1494494	1071721	45	46
,, 17	...	1588972	1182363	45*	46
Total 1912	...	82008113	64965862	45	45
1911	...	82568198	69180352	45	—

* Approximately.

IN LONDON.

		Packages Offered.	Packages Sold.	Average Price. 1912. d.	Average Price. 1911. d.
Jan. 12	...	42000	40000	8·81	9·07
,, 19	...	31000	29000	8·75	8·88
,, 26	...	30000	29000	8·63	8·75
Feb. 2	..	22000	20000	8·57	8·75
,, 9	...	20000	19000	8·75	8·75
,, 16	...	21000	20000	8·78	8·88
,, 23	..	24000	21000	8·68	8·75
March 1	...	25000	24000	8·70	8·87
,, 8	...	21000	19000	8·67	8·87
,, 15	...	15000	14000	8·96	9·13
,, 22	...	22000	21000	9·14	9·07
,, 29	...	13000	12000	9·15	9·00

April	5	...	27000	26000	9·20	8·87
,,	19	...	30000	29000	9·09	8·87
,,	26	...	25000	23000	9·08	8·75
May	3	...	32000	31000	9·03	8·75
,,	10	...	26000	25000	9·12	8·75
,,	17	...	25000	25000	9·08	8·87
,,	24	...	31000	30000	9·06	8·75
June	7	..	13000	13000	9·05	8·75
,,	14	...	10000	19000	9·22	8·62
,,	21	...	16000	14000	9·08	8·55
,,	28	...	19000	19000	8·93	8·37
July	4	...	33000	32000	8·77	8·37
,,	11	...	38000	37000	8·61	8·25
,,	18	...	37000	35000	8·54	8·50
,,	25	...	36000	34000	8·40	8·62
August	1	..	47000	44000	8·25	8·87
,,	15	...	50000	44000	8·02	9·13
,,	22	...	51000	49000	8·10	9·13
,,	29	...	41000	39000	8·20	9·00
Sept.	5	...	37000	35000	8·23	8·75
,,	12	...	27000	26000	8·40	8·75
,,	19	...	30000	27000	8·32	8·75
,,	26	...	31000	28000	8·31	9·00
October	3	...	27000	26000	8·75	9·00
,,	10	...	22000	21000	8·98	9·25
,,	17	..	18000	17000	9·18	9·38
,,	24	...	21000	20000	9·27	9·38
,,	31	...	26000	22000	9·02	9·63
Nov.	7	..	16000	15000	9·28	9·63
,,	14	...	25000	23000	8·97	9·50
,,	21	..	17000	16000	9·00	9·50
,,	28	...	27000	25000	9·07	9·25
Dec.	5	...	25000	24000	9·17	9·25
,,	12	...	29000	28000	9·13	9·00
,,	19	...	29000	28000	9·06	9·00
Total	1912...		1280000	1207000	8·82	8·88
,,	1911...		1188000	1129000	8·88	—

RUBBER SALES, 1912.

IN LONDON.

			Quantities Offered. Ceylon.	Malays.	Average Price.	Ceylon Top Price.	Average Price 1911.
			Tons.	Tons.	s. d.	s. d.	s. d.
Jan.	3	...	84	422	4 10½	5 1	5 2½
,,	16	...	157	197	5 2⅜	5 5¾	4 9
,,	30	...	142	485	5 1⅜	5 3½	5 0⅜
Feb.	13	...	98	411	5 1⅝	5 4	6 1⅞
,,	27	...	125	725	5 1⅞	5 3¾	7 2
March	12	...	184	298	5 0⅝	5 8½	6 1½
,,	26	...	120	592	5 4½	5 7¾	5 10⅛
April	2	...	114	408	5 1⅞	5 3¾	5 10⅛
,,	16	...	106	647	4 11⅝	5 2⅜	5 6½
,,	30	..	84	606	4 8¾	5 0	4 9⅝
May	14	...	77	555	4 7½	4 11½	4 9
,,	21	...	30	360	4 7½	4 11½	4 6½
June	4	..	20	150	4 6⅝	4 10½	4 3⅛
,,	19	...	26	234	4 6½	5 0¾	4 5½
July	2	...	75	495	4 6¾	4 11¼	4 2⅞
,,	16	..	85	479	4 7¼	5 1¾	5 0
,,	30	...	102	520	4 6½	4 10½	5 2¼
Aug.	13	...	83	696	4 6½	4 10	5 2¼
,,	28	...	150	722	4 7⅝	4 10	5 3
Sept.	10	...	139	816	4 5½	4 8	5 1½
,,	24	...	183	737	4 3¾	4 6¼	5 2⅜
Oct.	8	...	135	685	4 2⅜	4 4	4 8⅜
,,	22	...	184	736	4 0¾	4 2½	4 6⅛
Nov.	5	...	129	577	4 0	4 1¾	4 4¼
,,	19	...	170	570	4 3	4 5	4 7⅛
Dec.	3	...	170	640	4 3⅝	4 5	4 7
,,	17	...	184	744	4 3⅜	4 4½	4 11¼
Total	1912...		3150	14507	4 8	4 10¾	5 0½
	1911...		1625	8317	5 0½	5 7	—

IN COLOMBO.

			Quantities Offered.	Price of Standard Grades. 1912.		1911.	
			lb.	R. c.	R. c.	R. c.	R. c.
Jan.	5	...	178929	2·60	to 3·47½	1·50	to 3·90½
,,	12	...	176561	2·60	to 3·55	1·25	to 3·87
,,	19	...	140299	2·70	to 3·60	1·35	to 3·25
,,	26	...	100218	2·65	to 3·72½	1·50	to 4·00
Feb.	2	...	109656	2·70	to 3·67½	2·20	to 3·97½
,,	9	..	92883	2·80	to 3·67½	1·50	to 4·05
,,	16	..	138824	2·72½	to 3·65	2·35	to 4·60
,,	23	...	104302	2·70	to 3·67½	2·50	to 4·92½
March	1	...	135939	2·60	to 3·67½	2·75	to 5·30
,,	8	...	99103	2·80	to 3·77½	3·25	to 4·85
,,	15	...	87140	2·85	to 3·95	2·75	to 5·00
,,	22	...	58613	2·90	to 3·95	2·25	to 4·80
,,	29	.	77555	2·90	to 3·75	2·75	to 4·45
April	19	...	119157	2·45	to 3·65	3·00	to 4·25
,,	26	..	57281	2·40	to 3·47½	0·60	to 3·98
May	3	...	67171	2·00	to 3·45	2·00	to 4·20
,,	10	...	89455	1·80	to 3·40	1·50	to 4·07½
,,	17	..	59324	1·90	to 3·40	1·50	to 3·55
,,	24	...	76687	2·00	to 3·37½	0·50	to 3·32½
,,	31	..	120503	1·70	to 3·35	0·75	to 3·20
June	7	...	75785	1·80	to 3·35	1·00	to 3·42½
,,	14	...	108274	1·75	to 3·37½	1·50	to 3·25
,,	21	...	73433	1·75	to 3·25	1·50	to 3·25
,,	28	...	104915	1·50	to 3·32½	1·15	to 3·25
July	5	..	119703	1·50	to 3·30	1·50	to 3·05
,,	12	...	94278	1·75	to 3·35	1·50	to 3·27½
,,	19	...	125895	1·80	to 3·45	2·07½	to 3·47½
,,	26	...	135566	1·80	to 3·35	2·00	to 3·57½
August	2	..	112537	1·75	to 3·25	2·30	to 3·67½
,,	9	...	103480	1·75	to 3·30	2·00	to 3·75
,,	16	...	169264	1·40	to 3·30	2·15	to 3·62½
,,	23	...	136333	1·65	to 3·45	2·50	to 3·85
,,	30	...	171867	1·65	to 3·40	1·80	to 3·72½
Sept.	6	...	125847	1·50	to 3·35	2·55	to 3·75
,,	13	...	147864	1·50	to 3·37½	2·55	to 3·77½
,,	20	...	145231	1·50	to 3·25	2·70	to 3·67½
,,	27	...	177027	1·50	to 3·17½	2·50	to 3·60
Oct.	4	..	192771	1·30	to 3·12½	1·95	to 3·52½
,,	11	...	136409	1·50	to 3·20	2·30	to 3·45
,,	18	...	145960	1·50	to 2·95	2·52½	to 3·40
,,	25	...	204620	1·30	to 2·85	2·17½	to 3·30
Nov.	1	..	162252	1·25	to 2·97½	1·50	to 3·20
,,	8	...	200207	1·50	to 3·05	2·50	to 3·20
,,	15	...	154471	1·50	to 3·07½	2·25	to 3·22½
,,	22	...	171340	1·50	to 3·10	2·20	to 3·25
,,	29	...	196769	1·80	to 3·15	2·40	to 3·22½
Dec.	6	...	221883	1·80	to 3·20	2·50	to 3·30
,,	13	...	190714	1·80	to 3·25	2·40	to 3·32½
,,	20	...	213098	2·00	to 3·20	2·50	to 3·32½
Total 1912		...	6407383	1·97	to 3·40	1·60	to 3·75

[Total quantity offered in 1911—2,514,192 lb.]

RUBBER SEEDS FOR CATTLE FOOD.

According to *Grenier's Rubber News*, a good deal of interest has lately been evinced in regard to *Hevea* seeds for milling purposes, and there has been some enquiry going on regarding the cost of collection. "For making cattle food, and for other purposes the seeds, which now carpet the ground beneath the trees and are trodden on and otherwise destroyed, ought to bring in some revenue, however small. If some reliable data can be framed as to the quantity obtainable and cost of collection, we feel sure that a new industry, either in the oil extracted, or cake made from it, will spring up, and may be of some benefit to the rubber industry when prices drop."

appointed and, when that has been effected, action is restricted to the "revenue district" governed by that Board. The appointment of a Board is dependent upon the wishes of the planting community in any particular district, expressed through their local Association. It is clearly not in the interests of any badly infected district to be placed under the Ordinance. Being already infected, they have little to gain and something to lose, as they would then be prohibited from disposing of their surplus tea plants. If, on the other hand, a district that is at present free from the pest is provided with a Board under the Ordinance, it has everything to gain but nothing to lose, for it could insist upon the prohibition given in the schedule, namely, against the reception (by any estates within their area) of plants from an infected district, while, being themselves uninfected, there is no bar to the sale of their own plants. At present they are at the mercy of any careless or thoughtless person who may be prepared to run the risk himself, regardless of the danger to his neighbours.

The question of the utility of the predaceous beetle (*Clerus formicarius*) as a possible enemy of "Shot-hole Borer," has been finally set at rest by the receipt of a few living larvæ of that insect. It was at once apparent that these larvæ were several sizes too large to be of any use to us. When quite young, they might be able to traverse the minute galleries of the borer but they would soon outgrow this possibility. They would be unable to complete their transformations and, consequently, could never establish themselves permanently in the tea bushes.

Tea Tortrix, Helopeltis and Others.

"Tea Tortrix" (*Capua coffearia*) has been reported from several districts, but trouble from this pest has been much less general than in previous years. This may be due, partly to a greater amount of rain during the early months of the year, which favours disease amongst the caterpillars, and partly to better cultivation.

There has been a marked scarcity of complaints of other caterpillar pests. I have received no notice of "Nettle Grub" (*Limacodidæ.*) Isolated outbreaks of "Red Slug" (*Heterusia cingala*) and *Caradrna reclusa* have been reported from the Kalutara and Deniyaya districts respectively. Two instances of minor attacks of the "Small Tussock" caterpillar (*Orgyia postica*) have occurred in the Deniyaya and Balangoda districts.

Helopeltis, also, has attracted very little attention, a single complaint from the Galle District and another from Kadugannawa being the only instances that have been brought to my notice.

"Yellow Tea Mite" (*Tarsonymus translucens*) has been reported from the Galle District.

Calotermes militaris, a "white ant" that hollows out the stems of living tea bushes, still occurs sporadically on some of the Lindula estates. Apparently the only cure for this pest, which breeds inside the stems, is to dig out and burn the affected trees.

Some seedling plants from the Ambawella district were found to be badly infested by a large "eel-worm," distinct from the common *Heterodera radicola*.

A very Remarkable Case of Infestation of Manufactured Tea by a Dermestes Beetle has been investigated. The tea was packed in the usual way and samples were retained in the Colombo Agent's office. These samples show no trace of infection. But when the chests were opened in Europe, the tea was found to be alive with beetles and fouled by the dead bodies of their larvæ and pupæ. The lead lining of the chests was said to be imperforate. No explanation of the presence of the insects is, at present, forthcoming. The tea was otherwise in good condition, being dry and without any signs of decay. There was nothing that would appear to be attractive to an insect of this genus. Indeed, in the sample that was submitted to me, there was no evidence that the beetles had been feeding upon the tea at all. Closely allied species of *Dermestes* are known to attack and breed in hides, bacon, dried fish, &c. If only a single chest had been affected, we might suppose that some foreign matter had been accidently included in the tea. But chest after chest was opened and found to be similarly infested. The whole affair is a mystery.

Rubber Pests.

The large root-borer of Hevea, described and figured in the *Tropical Agriculturist* of September, 1910, p. 221, appears to be growing more common in the Kelani Valley districts. Complaints of damage by this borer have come in from Avissawella, Padukka, Waga and Undugoda. One correspondent reports that a group of half-a-dozen old trees has been killed by this pest. Six or seven of the grubs have been found in a single tree. The borer is a large whitish, fleshy, grub, more or less cylindrical in form, but, with the segments immediately behind the head, much broader than the others. It is the larva of a Longicorn beetle, but of which particular species it is

impossible to say at present. Apart from the fact that most of the specimens that have reached me have been damaged in the process of extraction, it is always difficult to rear up boring larvæ when removed from their natural conditions. I have, however, planted one or two Hevea stumps (believed to contain borers) in a cage, and hope that the adult beetle may eventually appear. From the size of the grub the beetle is probably a large one, and should be a conspicuous object when resting on the stem of the tree. Meanwhile it will be advisable for rubber planters to regard all larger Longicorn beetles with suspicion, and destroy them when found "loitering" in their rubber clearings.

The "Rubber Slug" (*Mariaella dussumierii*), which was the subject of one of the R.B.G. Circulars last year, has again been reported this time from the Udagama district, where it is said to frequent the tapping wounds and to attack the shoots of young plants. The habit of imbibing latex does not appear to be confined to this single species, as I have received specimens of a small black slug of a distinct (but undetermined) species that was "found drinking the latex on freshly-tapped rubber trees" on an estate near Talawakele.

I continue to receive specimens of Scolytid beetles (allied to the "shot-hole borer" of tea) extracted from the stems of Hevea trees, and believed (by the senders) to be responsible for injury to the trees. I still believe this to be a misconception of the conditions. In every case that I have examined there have been unmistakable indications of earlier fungal disease. When the bark has been attacked by canker or any other fungus that kills the tissues, it becomes attractive to these small boring beetles which are unable to penetrate healthy laticiferous bark. What lends colour to the idea that the borers can make their way into healthy rubber bark is the fact that latex is sometimes found to be exuding from the perforation. This may be explained in several ways. Sometimes the outer layers only of the bark have been killed by the fungus. Borers will attack these spots and will attempt to drive their galleries into the deeper and as yet unaffected tissues, when they are repelled by the flow of latex. Or they may drive their tunnels too near the periphery of the diseased area and strike latex there. Another cause of bleeding may result from the separation of dead bark from the wood, leaving a cavity which often becomes filled with latex from surrounding healthy tissues. If this blister is pierced by the borers, the latex finds its way to the surface. The beetles may also penetrate bark that is temporarily devoid of latex, after which renewed activity may occur, accompanied by an exudation through the perforations. The principal species of "Shot-hole borers" that have been found in Hevea trees are *Xyleborus semiopacus*, *X. discolor*, *X. interjectus*, *X. perforans*, *Platypus solidus*, *Eccoptoperus sexspinosus*, and *Cryphalus plumieræ*.

A small species of millipede (*Prionopeltis greeni*) was reported to be infesting nurseries of Hevea rubber. It is extremely doubtful if these creatures were really responsible for any damage to the plants. They were more probably feeding upon decayed leaves and humus in the nursery beds.—E. Ernest Green, Aug. 2nd, 1912.

ELECTRICAL TAPPING OF RUBBER TREES.

LABOUR SAVING INVENTION.

To Revolutionise the Industry?

According to "The India Rubber World" of New York, there appears a possibility of the old system of rubber tapping, which has existed for nobody knows how many centuries, being superseded by a new invention of a German scientist, Mr. George M. von Hassel, who has been employed for many years by the Peruvian Government to explore the resources of its rubber territory. This gentleman, says our contemporary, who is a civil engineer by profession, has devised a method of extracting rubber from the tree, which if not instantaneous, is at least rapid and efficacious in its operation, and if it works out in practice as it has given promise of doing in the various tests to which the process has been subjected, it may probably be adopted. Here, briefly, is the apparatus that he has devised. "He places upon the trunk of the rubber-tree a piece of sheet-iron about five feet long, five inches wide, with the two sides folded back against the tree to a thickness of about two inches, constituting a hollow channel of sheet-iron. This hollow channel is divided into a series of fifteen to thirty sections; the number of sections depends upon the number of days the apparatus shall be worked. Each section has a mechanism for the extraction of the latex from the rubber-tree and a receptacle for receiving the flour, which also contains a preparation for the coagulation of the latex. When working Hancornia and Castilloa trees, plates provided with longitudinal canals are used instead of the receptacles for gathering the latex, and the product thus obtained is known as "Sernamby." This product is gained in the form of threads without

MANIHOT DICHOTOMA PLANTATION.

RUBBER VALUED AT 4*s.* WITH FINE HARD PARA AT 4*s.* 3*d.*

Very interesting reports were published lately showing that Dichotoma attracts the attention it deserves, especially for land too dry for other rubber producing trees.—We quote from the

BULLETIN OF THE IMPERIAL INSTITUTE:

"Manihot Dichotoma has given very encouraging results in Antiqua,"—

"In Ceylon Manihot Dichotoma is stated to thrive better than the Ceara tree (Glaziovii) and recently a number of the Dichotoma trees were tapped for the first time.—The rubber obtained was forwarded to the Imperial Institute and the results of its examination will be of general interest.

"The sample consisted of four pieces of dark brown thick crepe rubber :—

"Rubber represented by the two best pieces of this sample would probably realise about 4*s.* per lb. in London with fine hard Para at 4*s.* 3*d.* per lb.

INDIA RUBBER JOURNAL.

"The more or less successful results with Manihot Glaziovii have led others to hope for equally good or better results from other species of Manihot."—

"One of the most attractive of these is Manihot Dichotoma, a tree which grows somewhat rapidly in districts far too dry for other rubber yielding plants, having a climate more in accordance with the requirements of cotton, than any other tropical product."—

Seed of Manihot Dichotoma we supply as follows:—10 lbs. net by parcel post, postage paid, on receipt of £3. Bags of 135 lbs. net at 3*s.* 6*d.* per lb. net cash, maritime packing included f.o.b. Hamburg.—

Seed of Manihot Glaziovii and Manihot Piauiensis at the same rates.—

Gevekoht & Wedekind

Hamburg 1.

Telegraphic-Address: "Gevekind Hamburg."

:: **A. B. C. Code 5th Edition.** ::

the aid of acids or other chemical substances. The method of operating is as follows: This channel of sheet-iron, with the above-described mechanism and receptacles, is fastened against the rubber-trees. If it is a small tree there will be two of these devices; if it is a large tree, there may be as many as nine circling the tree and about a hand span apart. This apparatus is connected by an insulated wire with a central station which is equipped with electric power. A machine devised by the inventor makes it possible to send the electric current so that it will set the first section in motion. The latex then oozes out and flows into the receptacle immediately beneath. In the receptacle there is an acid preparation that coagulates the latex, converting it into rubber. The next day—or preferably forty-eight hours later—the current is turned on again affecting the second section, which in turn pricks the tree, bringing for the latex which drips into the second cup and is there similarly coagulated. After another interval of two days, the third section is set in motion, and so on for the fifteen to thirty sections, which are operated from the central station, tapping the tree and filling the receptacles with rubber." It is not necessary to examine the tree until the expiration of sixty days, when a handful of rubber will be found in each of the receptacles, and on a large tree when there are none of these devices—each with thirty cups—there will be 270 lumps of coagulated rubber waiting for the gatherer. It is stated that the same current that does the work on one tree can do the work on 5,000 trees by simply equipping that number of trees and connecting by the insulated wire, so that the electrical current can be communicated. In an actual test already made, between fifty and sixty trees have been tapped at one time from the central station. According to Mr von Hassel the advantages are as follows: First, the enormous saving of labour, one man being able to do the work of forty under the old system; secondly the power to tap trees in the swamps which cannot often be approached by the tapper; third, the fact that the trees can by this process be tapped very early in the morning before the sun is up, when the latex flows more freely; and fourth, the fact that the trees cannot be injured by this process, as the punctures are very small and heal rapidly.—*H. & C. Mail*, Dec. 27.

INDIA RUBBER MARKET REPORT FOR 1912.

By Messrs. Gow Wilson & Stanton Ltd.

PLANTATION RUBBER.

Increase in Production.

13 & 23, Rood Lane, London, E. C.—During the past year remarkable progress in every direction has characterised the Plantation Rubber Industry and few parallels could be found to the rapidity with which it has come to be the dominant factor in the market for the commodity.

Six years ago the production of rubber from the whole of the East was about one thousand tons, whilst this year's crop should amount to about 28,500 tons. During the former period the average Public Sale price for the proportion of that crop which was sold in London was 4/9½, and something like 44 times that quantity has this year realised an average of 4/7½.

Exports of Plantation Rubber from Malaya and Ceylon Since 1905.

	Port Swettenham. Tons.	Singapore and Penang. Tons.	Ceylon. Tons.	Total. Tons.
1905		130	75	205
1906	327	385	146	531
1907	649	885	248	1133
1908	919¾	1639	371¼	2010¼
1909	1321¾	2010	666¼	3997
1910	3482	2574	1465	7521
1911	5406	5373	3194	13973
1912	†13850	†5243	*5395	§24488

† Exports up to Dec. 1st. * Exports up to Nov. 25th. § To end November.

The reputation which the Plantation grades have now established, though perhaps still leaving something to be desired, has continued steadily to improve, and the way in which the whole of the supplies are absorbed almost as soon as landed shows that with increased experience manufacturers are finding how to treat them to the best advantage.

Course of Prices.

The course of the market has shown some uncertainty, but fluctuations during the year have been within narrower limits than in any year since 1906, as is shown by the following table:—

Highest and Lowest Public Sale Averages, 1906 to 1912.

	1906	1907	1908	1909
Quantity Sold (in Tons)	348	814	1,925	2,684
Lowest and Highest Average during each year	4s 9d to 6s 0½d	3s 1⅝d to 5s 6 7-8d	2s 10½d to 5s 6d	4s 11½d to 8s 5d
Range of Fluctuation	1s 3½d	2s 5 1-8d	2s 7½d	3s 5½d
	1910	1911	1912	
Quantity sold (in Tons)	5,193	9,699	17,657	
Lowest and Highest Average during each year	5s to 11s 11½d	4s 2½d to 7s 2d	4s to 5s 6½d	
Range of Fluctuation	6s 11½d	2s 11⅝d	1s 6d	

London Auctions.

There has recently been considerable discussion concerning the method of dealing with the larger supplies in London, and the advisability or otherwise of Auctions.

In our last year's Report we stated that "The larger Auctions were without doubt greatly assisting the Importer and Manufacturer by reducing the chances of wild and unwarrantable fluctuations in prices, which had in the past been so detrimental to the best interests of the Industry and robbed the market of the stability so essential for its normal development."

In glancing at the course of prices which have ruled during the whole of the present year, one cannot fail to be struck by the comparatively narrow fluctuations which have taken place in face of the extraordinary increase in the World's supplies, and no better argument can be found to refute the suggestion that the Auctions have been detrimental to the interests of rubber producers.

The following table gives particulars of the London auctions during the past seven years. The proportion of this year's crop so dealt with amounts to about two-thirds of the total production. There has been more disposition on the part of many of the producing Companies to sell a portion of their crops for forward delivery, and, provided this continues, there should be little danger of the auctions becoming so unwieldy as to have any adverse effect on markets.

Quantity and Average Price of Plantation Rubber Offered at Auction in London During the Last Seven Years.

1st Jan. to 31st Dec.	No. of Pkgs. Offered.	Quantity in Tons. Ceylon.	Malaya.	Total.
1906	.. 6402	98¼	250¼	348½
1907	.. 15380	192¾	621¼	814
1908	.. 24647	290	1005¼	1925¾
1909	.. 50602	432	2252	2684
1910	.. 95394	761¼	4433¾	5193¾
1911	... 177195	1622	8077	9699
1912	.. 316431	3150	14507	17657

1st Jan. to 31st Dec.	No. of Pkgs. Sold.	Average Price Paid.
1906	.. 4130	5/6½
1907	.. 7388	4/9⅜
1908	.. 16018	4/1½
1909	.. 40877	6/7⅜
1910	.. 85438	7/7¾
1911	... 163403	5/C½
1912	.. 297897	4/7⅛

Standardisation of Quality and Grading.

Every effort must be made by Planters to ship their rubber as uniform as possible in quality, and to maintain an even grading. In this way it will be possible to deal with a much larger proportion of the crops by private treaty for near and future delivery, thus keeping the Auctions within reasonable bounds. Visiting Agents

and Managers generally would be well advised to bear in mind the great importance of this standardising and grading on all estates.

The large amount of supervision (preferably European) required in the factory to maintain efficiency does not appear to have been sufficiently appreciated in the past, and many estates have been rather too much inclined to await the development of some possible new process before installing adequate machinery, which would most probably be required in the future whatever new methods might come into use.

The preparation of rubber generally has continued to make satisfactory progress, and it has been proved that the physical properties of the best prepared samples are fully equal to any other kind of rubber.

Crepe and smoked sheet still form the two principal and best descriptions manufactured. In the earlier part of the year the former was in most request and on the average realised the best prices; but, partly owing to the comparative shortage of first quality smoked sheet, this kind has since come into very strong demand, realising a premium over all other sorts.

A very large proportion of the whole crop is shipped in the form of crepe, but as the premium lately ruling on smoked sheet will inevitably cause a large increase in its production, it seems unlikely that that premium will be maintained.

The smoking process has many points to recommend it, especially as regards the strength and durability of rubber so treated. Up to the present this particular preparation has been a more cumbersome one and has taken a considerably longer time than that of crepe. Also, unless the smoking and drying have been very carefully and thoroughly carried out the rubber is sometimes liable to arrive in a moist and mouldy condition.

A process has recently been put on the market by which the essential ingredients in the fuel are utilised in a liquid form and converted into fumes. It is claimed that by this means a large crop can be very rapidly, thoroughly, and evenly cured, with the minimum of accommodation. A system of this kind should go far to solve many of the difficulties which have been associated with the smoking process in the past.

The quality of the lower descriptions has shared in the general improvement, but considerable irregularity is still found, and it is very important that they also should be standardised to a greater extent and as much of the impurities as possible eliminated before shipment.

Sorting and Packing.

Another point which might well receive more attention in the Factory is the sorting and packing of the rubber. In view of the considerable part of the crop which is now delivered on forward contracts, the rubber must be even and the better qualities free from all traces of heat and oil damage, "and on no account should stained or streaky rubber be packed in the same cases as the best." A large amount of time and expense are involved if rubber has to be re-sorted in the London warehouses, owing to the presence of these defects.

Small lots of odd qualities should be retained as far as possible in the factory until merchantable breaks of say three or four packages can be sent forward.

We still hear complaints of rough cases being used. The insides of the packages must be well planed and smooth, so that the rubber shall arrive free from saw-dust, chips of wood, etc. Care must be taken to see that both cases and rubber are thoroughly dry before packing.

We are pleased to note the question of drying, on which we laid stress last year, has received much more attention and excellent results have been obtained with most of the processes in use for quickly extracting the moisture from the freshly coagulated rubber. In view of the accommodation necessary to handle a large crop if naturally dried, this is a very important matter.

Owing to the increase in the volume of business it has been found that many of the details in the Rules require some amendment, and the formation of a Rubber Association to deal with such matters is under consideration.

Para and other Descriptions.

The Para crop for the last complete season shows an increase as will be seen from the table giving the receipts at Para for the last twelve years, but from other places the quantities have not shown any material change, and it is evident that the great bulk of the world's increased requirements can, therefore, only be supplied by plantation rubber from the East.

Receipts at Para During the Last Twelve Seasons.

	Tons.		Tons.
1900-01 ..	27,640	1906-07 ..	37,810
1901-02 ..	29,997	1907-08 ..	36,780
1902-03 ..	28,190	1908-09 ...	38,150
1903-04 ..	30,580	1909-10 ..	39,130
1904-05 ..	33,100	1910-11 ...	37,500
1905-06 ...	34,710	1911-12 ..	39,360

Dec. 31st, 1912.

Gow Wilson and Stanton.

SALES OF PRODUCE IN BRITISH AND CONTINENTAL MARKETS.

Fibres, Cotton, Grain, Oil Seeds, Hides and Skins, Timber, Rubber, Drugs, Wool, Ores, Mica, Gums, Tea, Cocoa, Coffee, Copra, Sugar, etc., are being regularly dealt in; Keymer, Son & Co., being selling Agents for Estates, Mills and Exporters.

Samples valued. Best ports for Shipments indicated.

The management of Estates undertaken. Capital found for the development or purchase of valuable properties.

KEYMER, SON & CO.,

Cables: KEYMER, LONDON.

Whitefriars, LONDON, E. C. (Same address since 1844).

S. FIGGIS & CO.'S ANNUAL REVIEW.

45, Fenchurch St., London, Jan. 2nd, 1913.

Plantation Rubber grown in Ceylon, British Malaya (Federated States, Perak, Malacca, Johore, Straits), Sumatra, Java, India, Borneo, &c.

		1912	1911	1910	1909
Exported from Ceylon (& India)	tons	6300	2750	1430	600
do Malaya, &c.	do	22200	11400	6800	3250
Total		28500	14150	8230	3850
			1908	1907	1906
Exported from Ceylon (& India)	tons		350	230	160
do Malaya, &c.	do		1450	780	350
Total			1800	1010	510

Brazil continues to supply us freely, and some districts of the "Amazons" show a good increase, the total shipments from Brazil, including Bolivia, Peru, Mollendo, Manicoba, &c., we estimate.

1912	1911	1910	1909
40,500	39,500	40,500	42,000 tons

The demand for Plantation Rubber (as we remarked in our last annual review) has been excellent throughout 1912, and practically the whole of the largely increased supply has gone to consumers.

The more frequent and larger selling "forward" has been a considerable factor in manufacturers' buying so largely and readily for their wants as they come under contract.

But also the great care and improvement in preparation by most planters has been a strong inducement to consumers of Plantation. The demand for Tires for Motors and Cycles has increased enormously.

We congratulate the managers on the general splendid output and quality. Ceylon at last shows a very marked increase. South India and Mergui also, of very nice quality.

We estimate 950,000 acres under Rubber cultivation in the East—part will, no doubt, revert to Jungle—but of the probable 110 million trees, only a moderate proportion have been tapped.

Many Estates wisely continue to employ Mycologists to study diseases and watch remedial measures—we hear of fewer complaints of "Fomes."

We urge that all Rubber be packed loose and dry: flat in lengths of the cases, and not doubled over or twisted. 17,600 tons have been sold in the auctions held here every fortnight,

Rubber should not arrive mouldy and damp, as such will not pass as "fair average" quality.

The proportion of "Smoked" Rubber has greatly increased and it is liked, if well done, of uniform colour and not oversmoked and sooty. Fine smoked sheet should be ribbed and even, like "Highlands" which has realised high prices.

Rubber should be washed as clean as possible, and very small lots of different descriptions are not liked. Lots of under 4 cwt. are sold as "star lots" at the end of the auctions.

The cases should be strong, 1 to 2 cwts seem regular sizes, but perhaps double that size may be found suitable as quantities increase.

No paper or fullers earth should be used. Cotton adhering to rubber from the presses, is very much objected to and depreciates value,

The cases should be planed smooth inside, to avoid small pieces of wood adhering to the rubber.

We understand some new process will be tried to produce Rubber in the form of Fine that comes from Brazil—the samples we have seen appear good, and we hear the process of preparation is very rapid, but only results of imports can establish the suitability of new descriptions.

We are inclined to repeat our suggestions to "Standardise" qualities into No. 1 Latex pale, No. 2 clean light brown and grey, No. 3 (from bark) dark and brown,

There has been a continued and universal extension of motor vehicles and the world's increased supply of Rubber has been absorbed. Probably 99,000 tons, as detailed on the last page—stocks now are small,

Imports of Extracted Rubber from Jelutong have declined—shipments of Raw Jelutong were about 25.000 tons. Rambong has been in small supply and sold well—Castilloa also, but was mostly too soft, Guayule, partly owing to the revolution in Mexico, has fallen to 7,000 tons. The manufacture of "reclaimed" rubber has been very great, and as "reclaiming" is now so general, this must be considered a serious factor.

Last January good sheet sold at 4s 11d, to-day's price 4s 6d, smoked 4s 11½d, today's value 4s 8½d; pale crepe at 4s 11½d, today's value 4s 7½d; the frequent fluctuations are detailed monthly below.

RUBBER PLANTATIONS.

	1912. acres.	1911. acres.	1910. acres.	1909. acres.	1908. acres.
Ceylon	220,000	210,000	200,000	187,000	18[illegible],000
Malaya, Malacca	430,000	35[illegible],000	290,000	240,00	1[illegible]5,000
Borneo	20,000	20,000	12,000	10,000	10,000
Dutch E.I., 80,000 Java 150,000 Sumatra, &c,	230,000	200,000	185,000	12[illegible],000	90,000
India and Burmah	40,000	40,000	30,000	31,000	30,000
German Colonies, Samoa (2,000) E. & W. Africa	42,000	45,000	45,000	38,000	—

Mexico, Nicaragua and Honduras have probably planted 80,000 acres, mostly Castilloa; also Colombia, Ecuador, Bolivia and Peru.

India is extending. More in Burmah and Mergui: the Phillipines (small as yet), Samoa, Hawaii, other Islands and New Guinea, Queensland small, and Seychelles little. The East and West Coast of Africa have plantations; some also in Congo region and German West Africa, also in British East Africa, Uganda, and the West Indies (probably 5,000 acres)

FROM BRAZIL, AMAZONAS, BOLIVIAN, PERUVIAN AND (WILD) MEDIUM RUBBER.

The consumption of rubber continues to increase with the supplies, and 1912 has been an active year for manufacturers—the tire trade is especially much bigger, as the demand for Motor Vehicles and Cycles developes so greatly. Probably of Raw Rubbers 99,000 tons were used, besides great quantities of reclaimed, but less of mediums, which have not been so abundant.

Europe has had a good and increasing trade, and America has very largely increased.

The Brazil Syndicate have disposed of two-thirds of their holding of old Para at a heavy loss.

The supply of Eastern Plantation increases very rapidly and is sold at once in our fortnightly auctions, which Brazil must take account of.

Monthly fluctuations of Para, 1912.

HARD FINE.

January	... opened	4s 3d	highest	4s 8d
February	... lowest	4s 6d	do	4s 7½d
March	... do	4s 7½d	do	5s 2d
April	... highest	4s 11½d	lowest	4s 7½d
May	... do	4s 8½d	do	4s 7d
June	... lowest	4s 7d	highest	4s 10½d
July	... do	4s 8½d	do	5s
August	... do	4s 10½d	do	5s 2d
September	... highest	5s 1½d	lowest	4s 6⅝d
October	... do	4s 7½d	do	4s 4d
November	... lowest	4s 2½d	highest	4s 6d
December	... do	4s 5d	closing	4s 6½d

SOFT FINE.

January	... opened	4s 1½d	highest	4s 7½d
February	... lowest	4s 6½d	do	4s 7½d
March	... do	4s 7d	do	5s
April	... highest	4s 11d	lowest	4s 7½d
May	... do	4s 8d	do	4s 5d
June	... do	4s 6⅝d	do	4s 2d
July	... lowest	4s 2½d	highest	4s 6½d
August	... do	4s 5d	do	4s 10½d
September	... highest	4s 11d	lowest	4s 6d
October	... do	4s 6 [illegible]	do	4s 1½d
November	... lowest	3s 11d	highest	4s 1½d
December	... do	4s 2½d	closing	4s 3½d

CAUCHO BALL.

January	... opened	3s 9½d	highst	4s
February	... highest	3s 11½d	lowest	3s 10½d
March	... lowest	3s 11d	highest	4s 3d
April	... highest	4s 2½d	lowest	3s 10½d
May	... do	3s 11d	do	3s 6½d
June	... lowest	3s 6d	highest	3s 7⅝d
July	... do	3s 6½d	do	3s 9½d
August	... do	3s 8d	do	3s 10d
September	... highest	3s 10d	lowest	3s 6d
October	... do	3s 6½d	do	3s 4d
November	... lowest	3s 3d	highest	3s 6½d
December	... do	3s 5½d	closing	3s 6½d

VISIBLE SUPPLY 1ST JANUARY, 1913.

		1913.	1912.	1911.
Of Para and Peruvian	tons	5,576	6,762	5,875
Including afloat to America and New York Stock	do	1,800	1,740	700
		1910.	1909.	1908.
Of Para and Peruvian	tons	3,278	3,188	3,722
Including afloat to America and New York Stock	do	1,150	1,305	510
Shipments 1912, from Brazil, Bolivia, and Peru (the Amazonas)	tons		42,410	37,730
Including Peruvian and Caucho	do		8,310	6,440
Shipments 1912, from Brazil, Bolvia, and Peru (the Amazonas)	tons	38,200	39,050	38,160
Including Peruvian and Caucho	do	8,160	8,250	7,460

Medium rubber has been in small supply and good qualities sold fairly well.

We had scarcely any Slab, and supplies of Ball increased ; this rubber has been greatly in favour.

This year's crop was good quality. All fine *should be cut and carefully selected before shipment.* Caucho Ball increased and relatively very high. Bolivia increased. Mollendo small. Venezuela *via* Orinoco small. Ceara and Manicoba good. Pernambuco and Assare small supply Mattogrosso crop increased, but some lots not very desirable quality. Mangabeira, from Mattogrosso, Santos, etc , fair supply, and good sold well.

Central America—Supply moderate. Mexico decreased supply. Guayule owing to revolutions and disturbance of labour decreased to 7,000 tons (nearly one-half of two years since). Colombia small. Ecuador was fair quality, also Nicaragua. Scarcely any plantation from these countries, we estimate 60,000 acres planted there, mostly Castilloa.

	1912	1911	1910	1909	1908
West Coast African (total about) tons.....	13800	15000	14800	15500	14000
Including Benguela and Mossamedes	1800	1900	1600	1920	1690
Loanda	420	430	800	950	700
Congo, French Congo and Soudan	6000	6200	6000	6300	5900

Good qualities have sold well from the Niger, Gold Coast, Accra and Lagos.

Good Qualities from the Cameroons, Sierra Leone, Gaboon and Conakry sold at high prices.

The French Congo and Soudan mostly from Senegal via Bordeaux and Havre, sold well.

	1912.	1911.	1910.	1909.	1908.
	Tons.	Tons.	Tons.	Tons.	Tons.
France	2,700	2,600	2,400	1,850	1,050
Liverpool imports W C African	3,400	4,200	4,600	2,900	2,580
Antwerp Congo, &c.	3,600	4,300	4,200	5,300	4,900

East Coast African.—Zanzibar, &c. small; good quality sold well. Nyassaland very little. Liberian more. Mombassa and Lamu: good parcels of Manihot and pressed strips met a good demand at full prices. Uganda small. Abyssinian less supply.

Madagascar—Decreased (probably 300 tons), odd small lots were difficult to sell at full value. Rangoon small. Assam but little, good sold well. Penang in good supply and sold readily at fair prices. Java and Borneo small, but we may expect increased supplies of Plantation from there. Tonkin and French Cochin China small supply sold at good prices. New Guinea sent us none. Jelutong has been high. Malaysian, extracted from Jelutong, good crepe, fairly clean, sold well.

Balata in fair supply, and closing lower : Sheet 3s 7d and Block 2s 5d. Gutta Percha higher for good qualities.

INDIA RUBBER STATISTICS FOR 1912.

Total Imports, &c., of all sorts were :—

ENGLAND.

		Imports.	Deliveries.	Stock, 31 Dec.
1912	...	43853	44238	3569 tons
1911	...	33964	34054	*a*3954 ,,
1910	...	32659	29980	*a*5231 ,,
1909	...	24563	24225	1848 ,,
1908	...	21611	23369	1510 ,,

a Estimated.

LONDON.

		Imports.	Deliveries.	Stock, 31 Dec.
1912	...	24014	23064	2764 tons
1911	...	13368	13001	1814 ,,
1910	...	9235	8392	1447 ,,
1909	...	5433	5207	604 ,,
1908	...	2983	3608	378 ,,

	Imports.		Deliveries.		Stocks, 31st Dec.	
	Para Manaos.	Peru Caucho.	Para Manaos.	Peru Caucho.	Para Manaos.	Peru, Caucho & Tails
...	11377	3792	12522	3843	252	49
...	11726	3753	11863	3952	*a*1397	145
...	12433	5577	11077	5350	*a*2448	617
..	10179	4630	10066	4588	388	390
...	11006	4310	11654	4461	275	348

a Estimated.

PRICES, 31st DECEMBER.

	Hard Fine Para,	Negrohead Scrappy.	Negrohead Island.	Caucho Ball.
1912 ...	4/6½	3/5½	2/3	3/6½
1911 ...	4/3½	3/9	2/7	3/9⅞
1910 ...	5/7	4/2	2/10	4/2½
1909 ...	7/7	4/7	3/1	4/1½
1908 ...	5/1½	3/9½	2/6	3/7

	1912.	1911.	1910.	1909.	1908
Imports of Rubber *a* ...	28684	18485	14649	9754	6295
Deliveries *a* ...	27873	18239	13553	9571	7254
Stock 31st December *a* ...	3223	2412	2166	1070	887

a besides (Brazil) Para and Peruvian to England

1912.	E. I. Plantation Ceylon, Malay, &c.	Rangoon, Assam, &c	Penang.	Borneo.	Zanzibar & Mozambique	Madagascar.
Imports ...	21211	60	438	298	388	68
Deliveries ...	20301	64	430	236	329	84
Stock 31st Dec. ...	2030	11	74	139	169	9

1912.	W. Indian & S. American.	Mattogrosso	Malaysian	Manicoba Assare, &c.	W.C.African.	Mollendo.
Imports ...	234	506	232	1191	3813	154
Deliveries ...	247	507	230	125	3957	157
Stock 31st Dec. ...	113	91	19	265	274	1

	E. I. Plantation Ceylon, Malay, &c	Rangoon, Assam, &c.	Penang.	Borneo.	Zanzibar & Mozambique	Madagascar
Imports 1911 ...	10656	146	256	190	384	92
do 1910 ...	6598	96	378	222	528	132

	W. Indian & S. American.	Mattogrosso.	Malaysian.	Manicoba, Assare, &c.	W.C.African	Mollendo.
Imports 1911 ...	431	311	363	1236	4183	196
do 1910 ...	426	155	223	1083	4585	173

PARA MONTHLY STATISTICS, 1912. (Including Peruvain and Bolivian.)

SHIPMENTS (January to December) Shipping Weights

1912.	Reciepts at Para. Para. tons,	Peruvian. tons.	Shipments to Europe. tons.	Shipments to America tons.
January ...	4150	710	2340	1370
February ...	3920	920	2490	2640
March ...	3080	1320	2210	2680
April ...	2350	920	1730	1350
May ...	2440	970	1130	1900
June ...	1770	800	1870	1170
July ...	1470	470	1320	1170
August ...	1640	260	1210	1540
September ...	2330	290	1260	1260
October ...	3520	400	1680	2420
November ...	3260	500	2510	1710
December ...	4170	750	2210	2210
(Shipping Weight)	34100	8310	21960	21420
against in 1911	31290	6440	19740	16180
1910	30040	8160	22930	15050
1909	30800	8250	19810	19480
1908	30700	7460	20630	17580

ENGLAND (Landing Weights).

1912.	Imports,	Deliveries.	Stock end of month.
January ...	1121	1218	*a*1450
February ...	1745	1635	*a*1560
March ...	1940	2140	*a*1360
April ...	1466	1429	*a*1397
May ...	1257	1378	*a*1276
June ...	737	955	*a*1058
July ...	1261	1144	*a*1175
August ...	915	1155	*a*935
September ...	1043	1279	699
October ...	928	1196	431
November ...	1285	1308	408
December ...	1471	1533	346
(Shipping weight)	15169 tons	16365 tons	net
against in 1911	15479 tons	15715 tons	
1910	18010	16427	
1909	14809	14654	
1908	15316	16115	

	Imports.	Deliveries.	Stock 31, Dec.
American	1912...122,030	1912...21,990	1912...350
(Para and Peruvian	1911... 17,685	1911...17,645	1911...310

a Estimated.

CROP STATISTICS from 1st July to 30th June each year. (12 months).

	1911-1912.	1910-1911.
Para Receipts		
Para, & Manaos ...	32,230	30,270
Peruvian & Caucho ...	7,130	7,230
Para Shipments to		
Europe (Para & Manaos) ...	15,600	14,870
,, (Peruvian) ...	4,660	5,040
America, (Para & Manaos)	17,920	11,970
,, (Peruvian) ...	2,650	1,600

	1909-10.	1908-9.	1907-8.
Para Recipts			
Para, & Manaos ...	31390	13010	29,180
Peruvian & Caucho ..	7,740	8,080	7,470
Para Shipments to			
Europe (Para & Manaos)	15,970	13,570	16,010
,, Peruvian) ...	5,890	5,630	5,730
America (Para & Manaos)	15,400	16,560	12,990
,, (Peruvian) ...	1,640	2,490	1,680

PARA CROP STATISTICS.—30th June, 31st December (6 months).

PARA Receipts:

	Para.	Caucho.	1912.	1911.	1910.	1909.	1908.
1912	16390	2670	19060	16010	15780	16710	15750
1911	14520	1490					

PARA Shipments:

	Para.		Caucho.				
Europe	8330	1860	10190	8490	8660	7590	6980
America	9020	1290	10310	9460	6850	8840	8410
ENGLAND Landings net			6903	6165	6344	6205	5328
,, Deliveries ,,			7615	8643	6069	6539	7160
AMERICA Landings ,,			9330	9695	6780	8240	9220
,, Deliveries ,,			9150	9685	6650	8880	9345
CONTINENTAL Imports ,,			2155	1430	1380	1030	1210
,, Deliveries ,,			2240	1470	1370	1020	1440

EAST INDIA PLANTATION.— Monthly Statistics 1912.

1912.	Shipments (Jan. to Dec.) Malaya.	Cey-lon.	London (Landing Weights). Imports.	Deli-veries.	Stock.
January ...	1719	196	1337	1280	1177
February ...	1919	808	1690	1339	1528
March ...	1650	384	1980	1583	1925
April ...	1416	322	1784	1689	2020

May	1391	156	1265	1816	1469
June	1483	450	891	1108	1252
July	1550	465	1769	1314	1707
August	2370	648	2138	1752	2093
September	2230	606	2166	1793	2466
October	1895	521	2008	2130	2344
November	2260	964	2526	2340	2530
December (estd.)	2300	780	1657	2157	2030
Totals	22183	6300	21211	20301	tons nett.

1912.	Value of First Latex Crepe.			
January	Opening	4-11	Highest	5-5
February	Lowest	5-3	,,	5-3½
March	,,	5-3	,,	5-9
April	Highest	5-5	Lowest	4-11½
May	,,	5-0¼	,,	4-10½
June	Lowest	4-10	Highest	5-2
July	,,	4-9½	,,	5-1
August	Highest	4-11	Lowest	4-9⅛
September	,,	4-10¾	,,	4-6
October	,,	4-5½	,,	4-1¾
November	Lowest	4-1½	Highest	4-5
December (estd.)	,,	4-4½	,,	4-7½

WORLD'S SUPPLY AND CONSUMPTION
(Estimated).

Amazonas and Brazil	tons	40,500
West African	,,	13,800
East African (Wild), Penang, Borneo, Rangoon, Assam, Madagascar, &c.	,,	4,000
Central American, Mexican, &c.	,,	2,500
Plantation	,,	28,500
		89,300
Guayule	,,	7,000
Malaysian, and Extracted from Jelutong	,,	2,700
		99,000

and enormous quantities of "Reclaimed" rubbers.

Europe			
England	...	tons	14,500
Germany, Austria, &c.	...	,,	16,000
France	...	,,	9,500
Russia	...	,,	9,000
Italy, &c.	...	,,	1,500
Japan and Australia	...	,,	1,000
America and Canada	...	,,	47,500
			99,000

S. FIGGIS & Co., *Rubber Brokers*,
2nd January, 1913. LONDON.

FEEDING CATTLE ON PRICKLY PEAR.

A Novel Experiment.

Bombay, Jan. 4.—The Bombay Agricultural Department have investigated the experiments made last spring by an Englishman at Dhond, named Norton, in feeding cattle on prickly pear. Professor Knight of the Department reports on its working and says that milch cattle were kept for a long period in a condition of more than average excellence on fodder consisting entirely of prickly pear with thorns singed off, with 60 pounds of cotton seed to 1,000 pounds of pear. The pear is put through the chaff cutter and cotton seed oil is added to counteract any irritative effect caused by it.—*Madras Times.*

INDIGOFERA ARRECTA IN CEYLON.

EXPERIMENTS AT GANGAROOWA, PERADENIYA.

Two small plots, of about half an acre each, had been sown at Gangaroowa Experimental Station, Peradeniya, end of August last, from seed supplied by Baron Schrottky. One plot was sown broadcast, the other plot was sown drilled 18 inches apart. The plots are part of the old Gangaroowa estate, which has been about 56 years in Coffee and about 25 years in Cocoa, loamy red Kandyan soil of a practically abandoned estate.

The Indigo has

GROWN WELL,

a full crop having been obtained in both plots. The plants are, according to the difference in the soil, from six feet high down to one foot in height.—A growth of six feet in four months is phenomenal for Indigo.

Planters interested should now go and see these plots, which prove that *Indigofera arrecta* will grow well in the island and yield full crops under certain given conditions.

As regards

THE YIELD OF DYE

in Ceylon, the manufacturing results at Lagos estate have shown that the yield of dye has fully come up to the estimate Baron Shrottky published in his recent paper on Indigo in Ceylon

SISIL HEMP IN GERMAN EAST AFRICA

H. M. Vice-Consul at Dar-es-Salaam (Mr. N. King) reports that, according to the local press, the cultivation of sisal hemp in German East Africa yields a crop second only to rubber in importance to the Protectorate. The plant was introduced into the country from Central America some 15 years ago, and the exports of fibre have increased from 204 metric tons in 1901 to 7,228 metric tons, valued at £150,569 in 1910. The plants attain full growth in East Africa in about seven years, but the first leaves can be cut after three years' growth. In 1911 there were 19,050 hectares (about 47,039 acres) planted with sisal in German East Africa, of which 7,655 hectares (about 18,901 acres) were productive. The majority of the sisal plantations are in the northern districts in the Tanga hinterland, where about 16,000 hectares (about 39,506 acres) are planted. There are about 2,000 hectares (about 4,938 acres) in the district of Lindi, to the south and plantations have recently been formed near the railway running from Dar-es-Salaam to Taborah. [Metric ton = 2,204·6 lb.]—*Board of Trade Journal*, Dec. 5.

THE CULTIVATION OF THE SOAP-NUT TREE IN ALGERIA.

The tree designated by Dr. L Trabut, director of the Algerian Government Botanical Bureau, as the *Sapindus utilis* (soap-nut tree) was first planted in Algeria at the Government nursery at Algiers in 1845. In 1859 cuttings were offered for sale under the name of *Sapindus indicus*, and all the soap-nut trees grown in Algeria have been derived directly or indirectly from the sapindus tree planted in 1845, which was probably of Asiatic origin, as the sapindus grows wild in different parts of Asia, and its nuts have been used instead of soap in China and Japan for centuries. The *Sapindus utilis* of Algeria resembles more closely the *Sapindus mukorossi* grown in China and Japan than any other variety of sapindus. The Government of Algeria encouraged the cultivation of the sapindus for a number of years. In a pamphlet published in 1895 and republished in 1898, Dr Trabut states that the cultivation of no other tree is more worthy of consideration by Algerian colonists who possess good land and are willing to wait some years for a remunerative crop. Monsieur M J Bertrand, President of the Société des Agriculteurs d'Algérie, the only Algerian who has grown the sapindus on a large scale, in a pamphlet published in 1907, strongly recommended its cultivation. He stated that the nuts of the sapindus contain more than twice as much saponin as Panama wood, and should find a remunerative and well-assured market. It was stated in the pamphlet that three particularly fine trees planted eight years previously which were carefully watered, produced six hundred pounds of dried nuts. The American Consul in Algiers says that the nuts of the sapindus have been used for many years in Algeria for washing purposes. The saponin extracted by boiling the nuts removes fat and grease very effectively, and leaves the textiles washed very soft and pliant, but the resin contained in the nut gives a yellowish tinge to linen. The sapindus nuts are principally used in Algeria for washing wool, woollen goods and coloured goods. Experiments have been made to find further uses for saponin, and a French chemist reported recently that he had obtained excellent results by using saponin in a mixture containing sulphate of copper for spraying vines It is claimed that, if no soapy substance is added when the plants are sprayed, the liquid adheres to the plant in small drops, and the greater part of its surface is not covered. When soap or saponin is added to the liquid, it spreads in a thick film over the entire surface. If, as is claimed, it is more economical to use saponin than soap for spraying with germicides, it is possible that sapindus nuts might be used for this purpose. Sapindus nuts can be purchased in Algeria at prices that leave only a small profit to the grower.—*Journal of the Royal Society of Arts*, for Dec. 20.

PAPER FROM BAMBOO.

Paper from the bamboo cane will soon be of the usual order of things. Scottish engineers are mainly responsible for bringing about this new departure. Not long ago an Edinburgh firm, who specialise in the making of plant for producing paper from bamboo, sent out two complete factory equipments to the Far East—one to convert cane into pulp, and the other to transform that pulp into the white paper.

On a site near Kagi (Japan) a factory is being installed with every requisite to deal in the first place with only 300 tons of pulp per month, but with room for any development. In this case, however, the pulp will be treated in Formosa, and shipped in rolls or sheets to the paper mills at Kobe; just in the same way as the wood pulp of Norway, Sweden, Russia and Finland is shipped to the United Kingdom to feed the British paper mills. Esparto grass gives way to wood pulp in this country for papermaking purposes, and it is hoped that in the Far East, bamboo pulp will enable Eastern mills to compete with the British and American imported paper of the finer qualities. One thing has to be borne in mind—that the process of manufacture from bamboo is a more expensive one than that from wood. Meantime, at any rate, experiments may cheapen the process, and the supply of the cane is practicably inexhaustable.

Furthermore, the bamboo is a plant that can readily be cultivated. If any particular species of bamboo is considered the best for papermaking purposes it can easily be grown in any quantity. Asia, Africa, America and Oceania all have forests of that plant. And a very interesting process is the manufacture of the cane into paper. It is cut up into small pieces, of one or two inches, then boiled with sulphate of lime, bleached by electricity, washed, machine rolled, and pressed into tissue form, and dried by steam. hen wound into rolls or sheets it has a pleasing appearance, and makes an excellent quality of paper.—*Statesman.*

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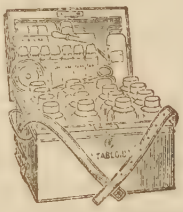

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THE SILK INDUSTRY OF CEYLON.

AND THE PERADENIYA FARM.

It has come to our notice on more than one occasion that the greatest known hindrance to the spread of sericulture in Ceylon is that the vast majority of the population, who might devote their time to the industry, happen to be Buddhists; and killing of any kind is strictly prohibited by their doctrine. But we are pleased to learn that the Salvation Army are doing all they can to interest the people in sericulture. There are some villagers in Rambukkana, Dumbara and Talanpitiya who are already rearing silkworms and a small supply of cocoons have been sent to the silk farm at Peradeniya for sale. The enthusiastic officer in charge of the Farm, Capt. Jergensen, keeps a supply of eggs to meet any application that may reach him. Eri silk seems to be the only variety that can with any success be introduced into the villages.

A visit to the Farm is always interesting. In 1910 the Ceylon Agricultural Society took back the Silk Farm from Mr. Braine, after everything was in a dormant condition for a long period and placed in charge of the establishment one of the Agricultural Instructors, Mr. W. Molegoda. He within a short period had brought the Farm into perfect condition; and since giving over to the Salvation Army in 1911 the condition of the Farm has been maintained. At present everything from seed to reeling can be seen at any time. Recently a very interesting set of pictures, illustrating the diseases and different stages of silkworm, has been hung up in the rearing shed. A new variety of worms—the French *Univoltine* has been introduced for the first time. The eggs have come from France direct. It is not proposed to carry on the breeding of this variety here, but to import eggs every year—a wise decision if the vigour of the stock is to be maintained. The silk produced from this variety is said to be very good. It is intended shortly to introduce the *Muga worm* that feeds on cinnamon leaves. A visit to the Farm is well worth paying; and the courteous officer in charge will explain everything and make the visit interesting.

In this connection it is worth noting from the 1911-12 Administration Report for Mysore that at the Tata Silk Farm at Bangalore, managed by the Salvation Army towards which an annual grant of R3,000 has been

sanctioned by Government, the subjects of sericultural study and instruction have been grouped as follows :—(*a*) *Mulberry department*, dealing with the details of the planting and cultivation of mulberry ; (*b*) *Worm-rearing department*, beginning with the carding of eggs and ending with the packing of cocoons ; (*c*) *Reeling department*, dealing with steaming and drying cocoons up to packing silk by means of the press ; and (*d*) *Weaving department*, beginning with bleaching raw silk and ending with the dressing of the finished silks after weaving. Of the number of persons who received instructions on the Farm during the year, 26 consisting of teachers, students, and raiyats belonged to the State, 21 were boarding students from Travancore, two from Madras and the Telugu country, and two were English Officers who have gone to open a silk farm in the Punjab. About 2,000 persons visited the Farm during the year, and 20,000 mulberry cuttings as well as 979,750 eri and mulberry eggs, selected and examined by the microscope, were sent out.

THE FUTURE OF THE AMAZON TRADE.

PRESENT DEPENDENCE ON RUBBER.

A very large amount of British capital is invested in the Amazon Valley. An important steamship line running from Liverpool is dependent on the Amazon trade, and the harbours both of Para and Manaos are in the hands of British concessionaires, and have their head offices in London. Besides these vast concerns there are numberless other British interests, such as waterworks and tramways, and the number of British shareholders in commercial enterprises in the Amazon Valley is very great. This trade, the harbour receipts, the freights, in a word, the whole of this business rests mainly on a single article—rubber.

Competition of Plantation Rubber.

Only a short time ago Brazil supplied 90 per cent. of the world's rubber, but plantation rubber has quite changed this proportion today. Even before plantation rubber from the East became a very serious factor, crisis after crisis occurred both at Para and at Manaos, and today when the increasing competition from the East, with its rapidly augmenting output and its pure rubber at low cost, is making itself very materially felt, the position is one which, to say the least of it, has very disquieting possibilities. Many important firms trading in these regions do not seem as yet to have reduced their liabilities at all; the capital of many has been increased, debentures issued, companies reconstructed, and new companies formed, all within the last two years.

Para, the port at the mouth of the Amazon, is not so absolutely dependent on rubber as is Manaos, a thousand miles higher up the river. Distilleries, saw mills and some cattle rearing are other industries, and Para is also a port of transhipment; but here, again, most of this transhipped cargo is to supply the needs of rubber workers and is paid for with money earned from rubber.

Thirty years ago Manaos was still very backward, a comparatively insignificant capital of a poor, little-known province, Thirty years ago rubber was in little demand and sold at a low price. Today all this is changed, with the demand for rubber increasing and the price rising, Manaos (and the conditions at Manaos are typical of those prevailing more or less throughout the Amazon Valley) has made enormous strides, and has become the fine city she is. But when the source of her wealth is looked into, it is found to rest entirely on rubber. Agriculture is neglected; what little there once was of cotton and maize growing has been abandoned; the forest has encroached on the clearings, and, most important of all, the labour has been diverted to rubber collecting.

Railway Construction and Labour.

A concession has been given to construct a railway along the Rio Branco, thus joining British Guiana and the Amazon Valley, and providing a means of ingress to the great supply of cheap and good labour from the West Indian islands, as well as opening up lands suitable for pasturing. Nothing, however, seems to have been done with this concession, and negroes from British possessions are not looked on with any too favourable eyes by Brazilians. It does seem, however, to be the one way in which the trade of the Amazon can be resuscitated when the rubber difficulty becomes acute. The increase in labour would be gradual and natural, and the food supply would keep pace with the increase of population, thus being far preferable to any importation of labour in the usual way by emigrant ships. The price of Amazon rubber cannot be reduced below a certain point, and the export duty, of at present 18 per cent, if taken off, while enabling the rubber to meet Eastern competition in the world's markets for a longer period, would eventually impoverish the State,

of which it is the chief source of revenue. In several places in the Amazon Valley beginnings have been made with rubber plantations. At one time it was thought that the rubber tree, Hevea Braziliensis, would be more likely to flourish in its native forests and soil than when transplanted to another continent. It is found that Liberian coffee grows extremely well at Santos, and now experiments show that the Hevea plant grows quite as well in suitable districts of the Old World.

FREIGHT: GOVERNMENT ATTITUDE.

The excessive cost of freight on all supplies which would have to be used on the Amazon estates, as well as the dearness and scarcity of labour, would militate very seriously against Amazonian rubber estates as compared with 'Para' rubber grown in the East. The Amazon Steam Navigation Company has been reorganised and, it is said, will make the distribution of goods and the freight of rubber on the Amazon and its tributaries cheaper.

Foreigners, and especially Englishmen, do not seem to realise the position which has arisen and which must become more and more strained, unless some disease were to attack the Eastern rubber plantations, such as practically exterminated coffee in Ceylon twenty years ago, and also did so much harm to Mysore planters. Rubber trees grown in unbroken masses are, of course, much more liable to disease, and to the spread of disease, than when growing at haphazard in the forest (it is a peculiarity of the Amazon forests that the same species of tree rarely is met with once in a hundred yards); but up to the present the Eastern plantations have not suffered.

The Brazilian Government has for some time been aware of the difficulties arising on the Amazon, and in the report to Congress made by the Minister of Finance early last month he insists on the necessity of encouraging other agricultural products besides rubber; admits the serious effect of Eastern competition, and, what is more important than all, actually anticipates a rubber crisis between 1915 and 1917. Palliatives may be found, but the sovereign remedy is the introduction of labour, and, unless some strenuous policy is adopted, it looks as if the Amazon trade would dwindle and shrink until it is enabled to re-establish itself on a sound agricultural basis and so be not entirely dependent, as at present, on the exploitation of one article of forest produce. —London *Times*, Dec. 31.

A TROPICAL COLLEGE OF AGRICULTURE.

Jan. 20th.

DEAR SIR,—In one of your recent editorials I noticed a reference to a Tropical College of Agriculture for Ceylon, and I have been waiting to see if the matter would be taken up by the Planters. I find, however, that this has not been done, and have wondered why.

The necessity for a training in agriculture as in every other profession, cannot be denied. The planter is every day realising how much he is indebted to the scientist for help and guidance. Why then does he not promote a scheme which would allow of young men taking up the profession of agriculture, receiving a proper grounding before entering upon the practical duties of that profession? It is about time the "creeper" system gave way to a more rational and up-to-date scheme of Agricultural Education. I do not condemn apprenticeship, which is all very well in its proper place, but we do not merely make apprentices of men destined for the Law and Medicine without also giving them the necessary grounding in principles which underlie practice. What a pity it is that H.E. the Governor could not have taken up this idea and carried it out with his wonted vigour. It is a big scheme and needs a strong man.

Tropical Agriculture, like Tropical Medicine, wants specialisation. This is being provided in the case of the latter; why not in the case of the former also? There is no institution in England that can adequately train a man for an agricultural life in the tropics; and that has been the reason, no doubt, why those who have finished their course at an English College have come out to Ceylon as cadets before proceeding to the African Colonies as officials.

"Tropical Life," in writing about this subject, refers to the West Indies as a likely place for such an institution; but Ceylon must surely be given precedence when the comparative merits of the two colonies are considered in this connection. It is unnecessary to go into further details on this point, but whether the Western Tropics are to have a college or not, the advantages of a similar institution for Ceylon cannot be gainsaid. The Philippines have already started one, and we should surely not be behind them.

No one should imagine for a moment that the idea of a college is to provide a training for European planters only. It must serve

the interests of all, whether European or Ceylonese, who desire to qualify as cultivators of the products which go to constitute the great agricultural industry of the tropics.

Apart from this there will, of course, be a course for those who wish to study what may be conveniently called pastoral agriculture, but up to a certain point both will travel along the same lines.

The point I wish to bring out is that all interested in the agricultural prosperity of the island whether European or Ceylonese, should look upon the college as a national necessity and should approach Government with a wish that such an institution should be started without undue delay—so that tropical agriculture may receive the same fostering care as is being bestowed on tropical medicine and thereby develop *pari passu*. But (and now I come to the pith of it) they should guarantee to raise a fund to meet the cost provided that Government undertakes to contribute an equal sum.

The new Director of Agriculture, I feel sure, will be a most sympathetically in this cause, and I would be inclined to suggest a public meeting of upcountry and lowcountry planters (and, in fact, of all who are interested in the matter) should be convened at an early date and that the Director be invited to take the chair. Who will take the lead?—Yours truly,

PROGRESS.

NOTES FROM NYASALAND, (B.C.A.)

B.C.A., Dec. 2nd, 1912.—Nyasaland has made great progress during the past few years, in all the old coffee districts. Now estates have been opened up. Many of the old abandoned places have changed hands at good prices from £1 to £1 10s per acre and are also being re-opened for

COTTON, TOBACCO, AND OTHER PRODUCTS.

Sir William Manning, our Governor, is certainly doing his utmost to further the interests of the Protectorate by the construction of macadamised roads as feeders to the railway, and by every other possible means in his power.

Stopping the labour emigration into the Transvaal and Rhodesian mines, too, has done good as our

LABOUR SUPPLY IS NOW ALMOST SUFFICIENT

(notwithstanding the increased acreage under cultivation) for the requirements of all, and, of course, will increase as the men return from S. Africa and find they have to, and can get work at home.

RAILWAY CONSTRUCTION.

The contract for a railway from our S. Highland line terminus to the coast at Beira has been signed, and is to be opened within three years; when this line is opened it will give a great fillip to the country, as the great drawback to Nyasaland's progress has been in the past want of access to the coast owing to our river not being navigable for one half of the year.

Negotiations are pending for the extension of Shire Highlands railway from Blantyre to Lake Nyasa which would be of great service to the lake districts that are so inaccessible for want of roads and railway.

Nyasaland is no longer depending on the one product coffee, that proved so disastrous to planters some ten to twelve years ago. We have rubber, tobacco, chillies, cotton and tea all growing on the same estates yielding profitable returns to the owners.

We want here good botanical gardens like your Peradeniya, Henaratgoda, Hakgala and others. Our Agricultural Department consists of a good many men, including the head, who know little or nothing of tropical agriculture. Of course, they will learn in time at the country's expense and then go elsewhere.—H. B.

A VERTICAL SYSTEM OF TAPPING.

Some time ago we announced (July 1st, 1911) that a vertical system of tapping young Hevea trees had been tried experimentally in Ceylon. A tree has been tapped on this system, at the Experiment Station, Peradeniya, with a special knife devised to effect vertical incisions in the manner indicated. The great claim made for this system was that the minimum amount of cortex was removed; incidentally it was pointed out that 4½-year-old trees in Ceylon could be tapped, some yielding, in 70 days' tapping, an average of 1 lb. 3 oz. of rubber. In this system of tapping, two channels are cut from the base to a height of 6 feet, the latex flowing down the channels, and is collected at the base. The following day other channels are made an inch to the right on both sides, and so on until the tree has been tapped on all surfaces. So far we have not heard of any planters taking up this system, but in view of the saving in bark said to be achieved it is a system which is worth ventilating in these columns.—*India-Rubber Journal*, Dec. 21.

CHINA TEA IN TIBET.

AN EIGHTEEN YEARS' SECRET REVEALED.

(TO THE EDITOR, *The Pioneer*.)

Sir,—In your issue of the 22nd Dec. you have a leading article on Tibet and Indian trade in which you say that the China compressed tea brick has an admixture which not only imparts to the beverage a rich red colour, etc., etc., and then further on you say Mr Sherring says the admixture is obtained from a plant growing wild, etc., etc. About 1895 I discovered the plant used by the Chinese. For very many years I had been puzzling myself to find out how the China brick composed of inferior *green* leaves gave such a rich red liquor. One day an assistant of mine found in a China brick very nearly the whole of a large leaf which certainly was *not* tea and I hunted through my forest (6,500 elevation) and at last found a similar leaf which was promptly treated as I would treat the tea shrub leaf with the result that I got an article very, very similar to dry tea which gave on infusion a rich red liquor and which gave warmth to the stomach and was sustaining. I sent down to Dr. Watt, at the Museum, Calcutta, all particulars of the tree, some of its leaves and a sample of the tea made from it and was told that the tree was Ethretta Serrata (Pun-ya of Kumaon) and that it had the properties required by the Tibetans and I was asked to send down some bricks of the pure Ehretta Serrata tea and of tea *and* Ehretta serrata mixed. This I did and in 1899 I saw the bricks I had sent in the Museum; whether they are still there I cannot say. Ehretta Serrata added to Hyson Skin, the most inferior of green tea, will give what the Tibetans want and look for in brick tea, viz, a green leaf, red liquor which is warming and comforting.

Mr Sherring was Deputy Commissioner of Almora when he went into Tibet and I may have mentioned to him that I knew what the admixture was and that I was putting it in my bricks and was having a good sale in consequence. I know he asked that some chests of bricks should be sent across into Tibet which was done.

Ehretta Serrata leaf requires to be picked in the spring just when the young leaves are appearing: then if treated exactly as one would treat the leaf of the tea shrub for *black* tea it will give an article undistinguishable from real tea in its dry state and the infused leaf will give a rich red liquor, but hardly fit for anyone to drink pure, indeed, I no not think a mixture of pure tea and Ehretta Serrata would give a liquor to suit the taste of anyone except a Tibetan.

Having kept the secret for over 18 years Darjeeling and Assam are welcome to it, but whether Ehretta Serrata grows in those districts I do not know; if not, I could supply a few chests for mixing purposes and a little goes a long way.

PLANTER.

—*Pioneer*, Jan. 5,

TOBACCO CULTURE AT CHILAW.

Tobacco cultivation, in the town, has commenced briskly. The continuous slow rains throughout the past month, during which Chilaw has been enjoying quite upcountry weather, have rendered the soil most favourable for the planting of seedlings, and every available inch of ground has been planted up. The dearth of cattle has compelled the use, this season, of artificial manure. It is to be hoped the experiment will prove a success. —*Chilaw Cor.*

THE CULT OF THE COCONUT.

This is a book which presents difficulties to the reviewer. What is the real object with which it has been written? Who is the author or authors of the work? These are the first questions that present themselves. If it is intended as an authoritative pronouncement on coconut cultivation and the coconut industry in general, it is a pity that the name of the author is kept back. Though purporting to deal with the coconut, there is also a good deal said about the African oil palm and other tropical products, such as the kola-nut. The arrangement adopted in the book—if there is any arrangement whatever—is very crude. Why was not a definite method of treatment adopted and information given under specific chapters? As it is, the reader finds himself in a maze of facts and figures and does not know where to find the information he is in search of. The publishers are Messrs. Curtis, Gardner & Co., Ltd., whose Intelligence Department claims to be an "Enquire Within upon Everything" to the investor. The book, which is attractively though cheaply got up, charges Great Britain with neglecting to foster her Agricultural and Commercial enterprises and develop the resources of the tropics as the Germans are doing. There is good deal in the book that is evidently not the outcome of actual experience,

Referring to species of the coconut we are told that there is another species, *Cocos butyracea*; also a specially large species bearing two nuts within one husk, *Lodiocea Seychillarum* (*sic*); but no information is given as to the commercial possibilities of either! Why is Copra always referred to as consisting of "dried *strips* of kernel?" The following is a description of how toddy is extracted :—

"The natives sometimes divert the coconut tree from bearing fruit by cutting off the flower stalks. By making an incision in the stump of the tree so checked from bearing fruit, and beating it, they obtain the flow of a juice called toddy."

This might be a passage from Knox, or a literal translation from the French. To find the age of a coconut palm we are told to divide the number of rings (scars) on the stem by two : since two such rings are created annually. To pick nuts "The natives climb the trees by means of the transverse rings or scars previously described and descend with the fruit!" As a popular book "The Cultivation of the Coconut" should interest a good many, though the title is hardly likely to prove as attractive as that of the French Edition "Richesses des Tropiques"; but it can hardly rank as a work of reference for the tropical planter.

NATURAL AND SYNTHETIC RUBBER.

I was extremely interested in Dr Perkin's paper on "Natural and Synthetic Rubber," but, apart from appreciation, I wish to say that two or three years ago I was travelling in the French Congo, and there saw an experiment in coagulation not mentioned in the paper. In my wanderings through the forest, I often saw creeping vines lying on the ground and twining round great trees in their endeavour to get out of the cathedral-like gloom below to the sunshine above. Owing to some difference with the authorities, the natives were not then exploiting this source of wealth; but as a mark of respect to me a man went out into the forest, and in a short time returned with a cup-like receptacle full of latex. This he put in a pot over the camp fire and added a little common salt. The result was astonishing in the suddenness of the transformation into a solid mass. Taking it out, he worked it for a few minutes and produced a white highly elastic ball, weighing rather less than half a pound. I came across this sample the other day and was surprised to find it a black, sticky mass that was unpleasant to touch.

The natives in the part of the French Congo referred to are primitive in the extreme and not troubled with much clothing, but from the example given they have learned a more comfortable method of coagulating rubber than by smearing it over their bodies. I never heard of this queer practice before, and I agree with Dr Perkin that it must be "an unpleasant sensation."

HUGH PEARSON.

Royal Society of Arts Journal, Dec. 20.

CITRONELLA OIL.

A New Method of Assay.

Boulez ("Bull. Soc. Chim., Paris" (4), 11, 915) describes a new method for the assay of citronella oil. He uses 25 to 50 grams of the oil, which if shaken up in an Erlenmeyer flask with 100 to 200 c. c. of concentrated solution of acid sulphite of potassium, which is saturated with neutral sulphite and then left standing until all the aldehyde is combined. An equal volume of water is then added, and the mixture is heated under a condenser, with frequent shaking, until the aldehyde is all dissolved as a sulphonic compound. The oil which remains unabsorbed is separated and weighed, and the geraniol is determined by acetylating the separated oil in the usual manner.—*Chemist and Druggist*, Dec. 21.

NEW SOURCES OF PAPER.

Under this heading the *Kew Bulletin* [No. 9, 1912] gives an illustrated account of *Hedychium coronarium*, Koen., and allies, as a source of material for paper-making. The plant, a member of the natural order *Zingiberaceae*, is a native of India, being distributed from the Himalayas to Ceylon and Malacca. It is also found in the West Indies, New Zealand, and elsewhere, and it covers large tracts of swamps in Brazil. Experiments have been made with specimens sent from San Paulo, and papers of exceptional tensile strength, exceeding that of Manila paper, have been produced from the fibre. Owing to a semi-gelatinous constituent the new paper is said to be practically "natural parchment." Samples of the paper and fibre have been placed in the Museum of the Royal Botanic Gardens, Kew. Besides possessing self-sizing qualities, the fibre is capable of being worked very quickly on the paper-making machine. Another plant, *Amomum hemisphericum*, for brown paper-making, is also described in the *Bulletin*.—London *Times*, Dec. 14.

HOLING BY DYNAMITE.

Sir S. D. Bandaranayake's Experiments.

Among the pioneers with this new system of cultivation is Sir Solomon Dias Bandaranayaka who, writing from his estate at Horagolla, states that in a block of 70 odd acres of land which he has just opened for coconuts about 2 acres were holed with dynamite. He promises to communicate to us the results of the experiment when they become manifest.

FOOD FOR HORSES IN MALAYA AND CEYLON.

Sir,—In your issue of Sept. 21 "A. N. P.," writing from Ceylon, suggests in reply to a correspondent that Guinea grass might serve as food for horses in Malaya, but adds that he does not actually know whether it thrives there. It does grow well here, but must be kept weeded, and, if manured, a patch of about 30ft. by 15ft. is sufficient for one polo pony. It grows in tufts, a nd should from time to time be separated I start cutting at one end, and cut two rows a day. By the time the end is reached the first two rows have grown sufficiently to start cutting again. My experience is that Guinea grass should not be given to ponies when it is wet.

FRANK MILLS.

Kuala Lumpur, Federated Malay States, Nov. 3.—*The Field*, Dec. 7.

A NEW INDIA-RUBBER PRODUCING PLANT.

A recent report of the Mexican Minister of Agriculture gives some interesting particulars of a tree, indigenous to that country, from which india rubber of a superior quality can be obtained. It is known to the natives by the name of "Cacaloschili." It is one of the many species of the "Plumeria," a genus common to Mexico and Central America. All the known varieties of this genus in Mexico yield a milky sap from which caoutchouc can be obtained. The "Plumeria rubra," the botanical name of this new plant, is found growing wild in the dry mountainous regions of Mexico at an altitude of 1,000 to 5,000 feet, where the annual rainfall is between 24 inches and 44 inches. Unlike the majority of rubber-producing plants, the "Plumeria rubra" thrives best in sandy or stony soil, amongst rocks, where it attains a height of stem of 6 to 15 feet, and a girth of 8 to 24 inches. The bark, which is light grey, is rough, and the flowers large and white. It is found chiefly in the territories of Moreco, Michoacan, Oajaka, Vera Cruz, Manzanillo, Guerrero, and in certain parts of Puebla. The tree is of quick growth, and is easily propagated by cuttings placed in the ground, where they take root in about four weeks. This mode of propagation is preferable to that by seed as the plants obtained by the former method begin to yield after the third year. The experiments which have been made with these plants at the botanical station of Tezenapa show that the rubber obtained from the young branches is superior in quality to that produced from the older portion of the tree. For this reason "tapping" is not resorted to, as is the case with the "Hevea Brasiliensis" and other rubber-yielding plants. The sap from the "Plumeria rubra" is extracted from the branches and young shoots which are cut off. This annual pruning appears to improve rather than injure the tree. The coagulated sap of this plant, according to analysis made by the chemist at the botanical station, contained 21·9 per cent resinous matter, 15·7 per cent water, and 25·5 per cent caoutchouc of excellent quality.—Royal Society of Arts Journal, Dec. 27.

Kandy, Jan. 14th.

DEAR SIR,—Reference is made in the Supplement to your issue of the 11th instant to a new Rubber known by the native name of "Cocalos chili" found in Mexico and Central America. The Botanical name of this plant, *Plumera-rubra*, proves it to be none other than the red flowered temple tree (Sin. Araliya), so common in gardens about Colombo: but people are led into making enquiries about it, imagining that it was something quite new. Not long ago, there was a description going the round of the press of a gigantic form of bean, but the interest in this new wonder subsided as soon as it was discovered through its Scientific name that it was the Snake Gourd! There is, therefore, some value in the employment of botanical nomenclature which is often put down as an exhibition of pedantry.

Seeing the way in which agricultural information of this nature is given currency to, we may before long expect to read of a vegetable monstrosity borne by a tree called *Artocarpus Integrifolia*, or a valuable oil nut, the product of *Cocos nucifera*.—Yours truly,

D.

PREPARATION OF PLANTATION RUBBER.

A VALUABLE TEXT BOOK.

Received from the F. M. S.

"The Preparation of Plantation Rubber" an official bulletin prepared by Mr B J Eaton, F.I.C., F.C.S., Agricultural Chemist to the Federated Malay States department of Agriculture, and which is on sale at this office, proves itself to be one of the most useful pamphlets on this subject that has been issued for some time. Exhaustive details of a series of experiments are described of the preparation of rubber from twelve-year-old trees, never tapped previously, and the result is to give accurate information which will dispose of a good deal of what has hitherto been accepted unreservedly. The experiments were of a comprehensive character and comprise the effects of different coagulants; the effects of iron salts on raw rubber, which go to prove the need for scrupulous cleanliness; the effect of common salt, peaty water, and sunlight on rubber, etc. There is an able chapter on the oxidisation of raw rubber samples and how to prevent it; while the growth of moulds and bacteria on rubber, and the effect of carbon dioxide are described. Defects in rubber; special coagulants, and special processes of coagulation are dealt with in some detail, while smoked rubber and smoking houses, machinery, drying sheds; density of rubber; the testing of rubber samples, and viscosities of rubber solutions are other invaluable chapters. The bulletin should be in the hands of all connected with the rubber industry.

MEASUREMENTS FOR A RAIN-GAUGE.

Allakolla, Madulkelle, Jan. 25th.

DEAR SIR,—Could you oblige me by telling me if the following measurements are correct for a rain gauge :—

Funnel ... 4 9-16th in. diameter.

Glass ... 1 9-16th ,, ,,

My rain gauge is on the top of my factory, in the centre of the roof, on a stand 2 feet high and about 60 feet off the ground, and I have measured the following rain this month. I have not sent in the account before as it seems utterly impossible, and I have been trying to find out where the mistake could have occurred, but cannot unless it is in the size of rain-gauge. I had the funnel through a half-inch plank and thence into a hole in a four-gallon kerosine oil tin. The funnel fitted tightly into the plank and no water could have got in, in any other way, except by going through the half-inch plank, which was certainly saturated. After the 11th I took this plank off and soldered a piece of tin round the hole in the tin, so that the funnel now fits closely over this, but even now the rainfall seems rather too much to be correct. So, I think, the measuring glass must be in the wrong ratio to the funnel, and shall be much obliged if you can enlighten me.—Yours truly,

JOHN HEMSTED.

JANUARY RAINFALL.

1	...	3·05	13	...	...
2	...	24 70	14	...	...
3	...	8 95	15	..	1·12
4	...	1·56	16	...	5·90
5	...	18·12	17	...	22 71
6	...	16·21	18	...	·10
7	...	4·00	19	...	·27
8	...	18·85	20	...	·75
9	...	10 50	21	...	·30
10	...	5·75	22	...	.20
11	...	1·37	23	...	·02
12	...	...	24	...	1·67
			Total	...	146·10

N.B.—Rainfall for each day is measured at 6 a. m. on the following morning.

[Mr. Bamford, of the Colombo Observatory, informs us that a typical gauge is a five-inch gauge, and a glass with an internal diameter of 1-7 inches. Half-an-inch of rain then fills 4½ inches of the glass, measured roughly. Ed.,—A. M. & J. F.]

RUBBER SEED OIL FOR PAPER UMBRELLAS.

The vegetable oil used in making paper umbrellas in Japan is pressed out of the seeds of the rubber plant. This oil is made in the various islands famous for oil and seeds from these plants. Sandy ground is favoured for the cultivation of the plant and the oil is extracted from the seeds by presses. The yield of seeds is estimated at 20 bushels per acre. The annual production throughout Japan amounts to 350,000 bushels, from which over a gallon of oil per bushel is extracted. The oil before it is used is boiled and then cooled until it can be applied by hand to umbrellas with a piece of cloth or waste. No machinery or tools are used in applying the oil. When the oiling is completed the umbrellas are exposed in the sun for about five hours. This oil is also used in making the Japanese lanterns, artificial leather, printing ink, lacquer, varnishes, oil paper, and paints.—*Madra* Jan. 14.

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MR. E. E. GREEN,

Government Entomologist, Ceylon.